

## **LAMPIRAN A**

- **Kode program untuk 6 buah kota**

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function PjgJalurAnt=PjgJalurAnt(Indeks);

global N D

PjgJalurAnt=0;
for i=1:(N-1),
    PjgJalurAnt=PjgJalurAnt+D(Indeks(i),Indeks(i+1));
end;
PjgJalurAnt=PjgJalurAnt+D(Indeks(N),Indeks(1));

% Program Penyelesaian jalur terpendek pada TSP dengan
% Algoritma Semut
clear;
clc;

global N D

% Koordinator kota
X= [...
    1  10
    3  10
    7  5
    16 6
    16 3
    21 5
];

N = size(X,1);
Indeks=1:1:N;

% Menghitung jarak antar kota
D = zeros(N,N);
for i=1:(N-1),
    for j=i+1:N,
        D(i,j) = sqrt((X(Indeks(i),1)-X(Indeks(j),1))^2 +
(X(Indeks(i),2)-X(Indeks(j),2))^2);
        D(j,i) = D(i,j);
        n(i,j) = 1/D(i,j);
        n(j,i) = n(i,j);
    end;
end;
PjgJalur=PjgJalurAnt(Indeks);

% Menggambar lokasi kota
for i=1:N,
    XX = X(i,:);
    for j = 1:N,
        plot([XX(1,1);X(j,1)], [XX(1,2);X(j,2)], 'y-');
        hold on;
    end;
end;

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end;
plot(X(:,1),X(:,2),'bs','linewidth',4);
text(X(:,1)+0.5, X(:,2)+0.5,num2str(Indeks));
axis equal; axis off;
plot([X(Indeks,1);X(Indeks(1),1)],...
[X(Indeks,2);X(Indeks(1),2)],'b-');
title(['Jalur Awal : ' int2str(Indeks),' ',int2str(Indeks(1))...
'-> Panjang Jalur = ' num2str(PjgJalur)]);
pause; hold off;
% inialisasi
t=0;
alfa=1;
beta=2;
rho=0.5;
dTho=zeros(N,N);
b=fix(1*rand(N,1))+1;
NCMax=100;
bb=b;
bTemp=zeros(N,1);
NC=1;
Q = 1*ones(N,N);
m=sum(b);
kTho=m/PjgJalur;
Tho=kTho*ones(N,N);
PjgJalurTerpendek=inf;

%mulai iterasi
while (NC<NCMax),
    s=1;
    b=bb;
    l=0;
    for i=1:N,
        for k=1:b(i),
            l=l+1;
            Tabu(l,s)=i;
        end;
    end;
    while s<N,
        s=s+1;
        bTemp=zeros(N,1);
        for k=1:m,
            TotP=0;
            for j=1:N,
                takada=isempty(find(Tabu(k,:)==j));
                if takada,
                    p(j)=(Tho(Tabu(k,s-1),j)^alfa*...
                    n(Tabu(k,s-1),j)^beta);
                    TotP=TotP+p(j);
                else p(j)=0;
            end;
        end;
        p=p/TotP;
        q(1)=p(1);
        for l=2:length(p),

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        q(l)=q(l-1)+p(l);
    end;
    r=rand(1);
    disp(r)
    temu=0 ; l=1;
    while ~temu,
        if r<=q(1),
            temu=1;
            KotaDipilih=1;
        elseif (r>q(l))&(r<=q(l+1));
            temu=1;
            KotaDipilih=l+1;
        end;
        l=l+1;
    end;
    q=[];
    bTemp(KotaDipilih)=bTemp(KotaDipilih)+1;
    Tabu(k,s)=KotaDipilih;
end;
b=bTemp;
end;
for k=1:m,
    PjgJalur(k)=PjgJalurAnt(Tabu(k,:));
    for s=1:N-1,
        dTho(Tabu(k,s),Tabu(k,s+1))=dTho(Tabu(k,s),...
            Tabu(k,s+1))+Q(Tabu(k,s),Tabu(k,s+1))/PjgJalur(k);
    end;
    dTho(Tabu(k,N),Tabu(k,1))=dTho(Tabu(k,N),...
        Tabu(k,1))+Q(Tabu(k,N),Tabu(k,1))/PjgJalur(k);
end;
for i=1:N,
    for j=1:N,
        Tho(i,j)=(1-rho)*Tho(i,j)+dTho(i,j);
    end;
end;
t=t+N;
dTho=zeros(N,N);
for k=1:m,
    if PjgJalur(k)<PjgJalurTerpendek,
        PjgJalurTerpendek=PjgJalur(k);
        Iterasi=NC;
        L=Tabu(k,:);
    end;
end;
end;

if (NC<NCMax),
    TTabu=[ Tabu PjgJalur' ];
    Tabu=[];
    bTemp=zeros(N,1);
    NC=NC+1;
end;
hold off;
plot([X(L,1);X(L(1),1)],...
[X(L,2);X(L(1),2)],'m-', 'linewidth',2);

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hold on;
plot(X(:,1),X(:,2),'bs','linewidth',4);
title(['Iterasi ke- ' int2str(NC-1)...
      ' -> Jalur : ' int2str(L),' ',int2str(L(1))...
      ' -> Panjang Jalur = ' num2str(PjgJalurTerpendek)]);
text(X(:,1)+0.5,X(:,2)+0.5, int2str(Indeks'));
axis equal; axis off; pause(0.1);
end;
JalurTerpendek=L
PjgJalurTerpendek=PjgJalurTerpendek
Tho=Tho(i,j)
hold off;
plot([X(L,1); X(L(1),1)], [X(L,2); X(L(1),2)],...
      'r-', 'linewidth',4); hold on;
plot(X(:,1),X(:,2),'bs','linewidth',4);
text(X(:,1)+0.5,X(:,2)+0.5,int2str(Indeks'));
title(['Iterasi ke- ' int2str(NC) ' -> Jalur : ' ...
      int2str(L),' ',int2str(L(1)) ' -> Panjang Jalur = '
      num2str(PjgJalurTerpendek)]);
axis equal; axis off; hold off;

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- **Kode program untuk 10 buah kota**

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function PjgJalurAnt=PjgJalurAnt(Indeks);

global N D

PjgJalurAnt=0;
for i=1:(N-1),
    PjgJalurAnt=PjgJalurAnt+D(Indeks(i),Indeks(i+1));
end;
PjgJalurAnt=PjgJalurAnt+D(Indeks(N),Indeks(1));

% Program Penyelesaian jalur terpendek pada TSP dengan
% Algoritma Semut
clear;
clc;

global N D

% Koordinator kota
X= [...
    1 10
    3 10
    3 8
    8 6
    10 8
    12 4
    13 6
    16 6

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21 2
25 1
];

N = size(X,1);
Indeks=1:1:N;

% Menghitung jarak antar kota
D = zeros(N,N);
for i=1:(N-1),
    for j=i+1:N,
        D(i,j) = D(i,j)+sqrt((X(Indeks(i),1)-X(Indeks(j),1))^2 + (X(Indeks(i),2)-
X(Indeks(j),2))^2);
        D(j,i) = D(i,j);
        n(i,j) = 1/D(i,j);
        n(j,i) = n(i,j);
    end;
end;
PjgJalur=PjgJalurAnt(Indeks);

% Menggambar lokasi kota
for i=1:N,
    XX = X(i,:);
    for j =1:N,
        plot([XX(1,1);X(j,1)],[XX(1,2);X(j,2)],'y-');
        hold on;
    end;
end;
plot(X(:,1),X(:,2),'bs','linewidth',4);
text(X(:,1)+0.5, X(:,2)+0.5,num2str(Indeks'));
axis equal; axis off;
plot([X(Indeks,1);X(Indeks(1),1)],...
[X(Indeks,2);X(Indeks(1),2)],'b-');
title(['Jalur Awal : ' int2str(Indeks),' ',int2str(Indeks(1))...
'-> Panjang Jalur = ' num2str(PjgJalur)]);
pause; hold off;
% inisialisasi
t=0;
alfa=1;
beta=2;
rho=0.5;
dTho=zeros(N,N);
b=fix(1*rand(N,1))+1;
NCMax=250;
bb=b;

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bTemp=zeros(N,1);
NC=1;
Q = 1*ones(N,N);
m=sum(b);
kTho=m/PjgJalur;
Tho=kTho*ones(N,N);
PjgJalurTerpendek=inf;

%mulai iterasi
while (NC<NCMax),
    s=1;
    b=bb;
    l=0;
    for i=1:N,
        for k=1:b(i),
            l=l+1;
            Tabu(l,s)=i;
        end;
    end;
    while s<N,
        s=s+1;
        bTemp=zeros(N,1);
        for k=1:m,
            TotP=0;
            for j=1:N,
                takada=isempty(find(Tabu(k,')==j));
                if takada,
                    p(j)=(Tho(Tabu(k,s-1),j)^alfa*...
                        n(Tabu(k,s-1),j)^beta);
                    TotP=TotP+p(j);
                else p(j)=0;
                end;
            end;
            p=p/TotP;
            q(1)=p(1);
            for l=2:length(p),
                q(l)=q(l-1)+p(l);
            end;
            r=rand(1);
            %disp(r)
            temu=0 ; l=1;
            while ~temu,
                if r<=q(1),
                    temu=1;
                    KotaDipilih=1;
                elseif (r>q(l))&(r<=q(l+1));
                    temu=1;

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        KotaDipilih=l+1;
    end;
    l=l+1;
end;
q=[];
bTemp(KotaDipilih)=bTemp(KotaDipilih)+1;
Tabu(k,s)=KotaDipilih;
end;
b=bTemp;
end;
for k=1:m,
    PjgJalur(k)=PjgJalurAnt(Tabu(k,:));
    for s=1:N-1,
        dTho(Tabu(k,s),Tabu(k,s+1))=dTho(Tabu(k,s),...
            Tabu(k,s+1))+Q(Tabu(k,s),Tabu(k,s+1))/PjgJalur(k);
    end;
    dTho(Tabu(k,N),Tabu(k,1))=dTho(Tabu(k,N),...
        Tabu(k,1))+Q(Tabu(k,N),Tabu(k,1))/PjgJalur(k);
end;
for i=1:N,
    for j=1:N,
        Tho(i,j)=(1-rho)*Tho(i,j)+dTho(i,j);
    end;
end;
t=t+N;
dTho=zeros(N,N);
for k=1:m,
    if PjgJalur(k)<PjgJalurTerpendek,
        PjgJalurTerpendek=PjgJalur(k);
        Iterasi=NC
        Bilanganrandom=r
        L=Tabu(k,:);
    end;
end;

if (NC<NCMax),
    TTabu=[ Tabu PjgJalur' ];
    Tabu=[];
    bTemp=zeros(N,1);
    NC=NC+1;
end;
hold off;
plot([X(L,1);X(L(1),1)],...
    [X(L,2);X(L(1),2)],'m-','linewidth',2);
hold on;
plot(X(:,1),X(:,2),'bs','linewidth',4);
title(['Iterasi ke- ' int2str(NC-1)...

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        '-> Jalur : ' int2str(L),' ',int2str(L(1))...
        '-> Panjang Jalur = ' num2str(PjgJalurTerpendek)];
text(X(:,1)+0.5,X(:,2)+0.5, int2str(Indeks));
axis equal;axis off; pause(0.01);
end;
JalurTerpendek=L
PjgJalurTerpendek=PjgJalurTerpendek

hold off;
plot([X(L,1);X(L(1),1)],[X(L,2);X(L(1),2)],...
     'r','linewidth',4); hold on;
plot(X(:,1),X(:,2),'bs','linewidth',4);
text(X(:,1)+0.5,X(:,2)+0.5,int2str(Indeks));
title(['Iterasi ke- ' int2str(NC) ' -> Jalur : ' ...
       int2str(L),' ',int2str(L(1)) ' -> Panjang Jalur = '
       num2str(PjgJalurTerpendek)]);
axis equal; axis off; hold off;

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## **LAMPIRAN B**

$$D = \sqrt{(x_j - x_i)^2 + (y_j - y_i)^2}$$

0	2	7.8102	15.524	16.553	20.616
2	0	6.4031	13.601	14.765	18.682
7.8102	6.4031	0	9.0554	9.2195	14
15.524	13.601	9.0554	0	3	5.099
16.553	14.765	9.2195	3	0	5.3852
20.616	18.682	14	5.099	5.3852	0

$$\eta_{ij} = 1 / D_{ij}$$

0	0.5	0.128	0.0644	0.0604	0.0485
0.5	0	0.1562	0.0735	0.0677	0.0535
0.128	0.1562	0	0.1104	0.1085	0.0714
0.0644	0.0735	0.1104	0	0.3333	0.1961
0.0604	0.0677	0.1085	0.3333	0	0.1857
0.0485	0.0535	0.0714	0.1961	0.1857	0

$$P_{ij}^k(t) = \begin{cases} \frac{[\tau_{ij}(t)]^\alpha \cdot [\eta_{ij}(t)]^\beta}{\sum_{j \notin \text{Tabu}_k} [\tau_{ij}(t)]^\alpha \cdot [\eta_{ij}(t)]^\beta}, & \text{jika } j \notin \text{Tabu}_k \\ 0, & \text{lainnya} \end{cases}$$

Dimana

$$\tau_{ij} = m / \text{panjang jalur} = 6 / 46.4592 = 0.129$$

➤ **Perhitungan secara teori tanpa menggunakan bilangan random**

\* Semut pertama

$$P_{(1,2)}^k = \frac{[0.129]^1 \cdot [0.5]^2}{[0.129]^1 \cdot [0.5]^2 + [0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0485]^2}$$

$$= \frac{0.03225}{0.035668} = 0.904. \text{ (Terpilih)}$$

$$P_{(1,3)}^k = \frac{[0.129]^1 \cdot [0.128]^2}{[0.129]^1 \cdot [0.5]^2 + [0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0485]^2}$$

$$= \frac{0.00211}{0.035668} = 0.059.$$

$$P_{(1,4)}^k = \frac{[0.129]^1 \cdot [0.0644]^2}{[0.129]^1 \cdot [0.5]^2 + [0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000535}{0.035668} = 0.0149.$$

$$P_{(1,5)}^k = \frac{[0.129]^1 \cdot [0.0604]^2}{[0.129]^1 \cdot [0.5]^2 + [0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0485]^2}$$

$$= \frac{0.00047}{0.035668} = 0.0131.$$

$$P_{(1,6)}^k = \frac{[0.129]^1 \cdot [0.0485]^2}{[0.129]^1 \cdot [0.5]^2 + [0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000303}{0.035668} = 0.0085.$$

Jalur pertama dari semut pertama adalah 1 – 2.

$$P_{(2,3)}^k = \frac{[0.129]^1 \cdot [0.1562]^2}{[0.129]^1 \cdot [0.1562]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.0535]^2}$$

$$= \frac{0.00315}{0.004805} = 0.655. \text{ (Terpilih)}$$

$$P^k_{(2,4)} = \frac{[0.129]^1 \cdot [0.0735]^2}{[0.129]^1 \cdot [0.1562]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000696}{0.004805} = 0.145.$$

$$P^k_{(2,5)} = \frac{[0.129]^1 \cdot [0.0677]^2}{[0.129]^1 \cdot [0.1562]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.0535]^2}$$

$$= \frac{0.00059}{0.004805} = 0.123.$$

$$P^k_{(2,6)} = \frac{[0.129]^1 \cdot [0.0535]^2}{[0.129]^1 \cdot [0.1562]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000369}{0.004805} = 0.076.$$

Jalur kedua dari semut pertama adalah 1 – 2 – 3.

$$P^k_{(3,4)} = \frac{[0.129]^1 \cdot [0.1104]^2}{[0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00157}{0.003747} = 0.419. \text{ (Terpilih)}$$

$$P^k_{(3,5)} = \frac{[0.129]^1 \cdot [0.1085]^2}{[0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00152}{0.003747} = 0.405.$$

$$P^k_{(3,6)} = \frac{[0.129]^1 \cdot [0.0714]^2}{[0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.000657}{0.003747} = 0.175.$$

Jalur ketiga dari semut pertama adalah 1 – 2 – 3 – 4.

$$P_{(4,5)}^k = \frac{[0.129]^1 \cdot [0.3333]^2}{[0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.0143}{0.01926} = 0.742. \text{ (Terpilih)}$$

$$P_{(4,6)}^k = \frac{[0.129]^1 \cdot [0.1961]^2}{[0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.00496}{0.01926} = 0.257.$$

Jalur keempat dari semut pertama adalah 1 – 2 – 3 – 4 – 5.

$$P_{(5,6)}^k = \frac{[0.129]^1 \cdot [0.1857]^2}{[0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00445}{0.00445} = 1. \text{ (Terpilih)}$$

Jalur kelima dari semut pertama adalah 1 – 2 – 3 – 4 – 5 – 6.

Jadi, jalur semut pertama adalah 1 – 2 – 3 – 4 – 5 – 6 – 1 dengan panjang jalur adalah 46.4592.

\* Semut kedua

$$P_{(2,1)}^k = \frac{[0.129]^1 \cdot [0.5]^2}{[0.129]^1 \cdot [0.5]^2 + [0.129]^1 \cdot [0.1562]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.0535]^2}$$

$$= \frac{0.03225}{0.037} = 0.871. \text{ (Terpilih)}$$

$$P_{(2,3)}^k = \frac{[0.129]^1 \cdot [0.1562]^2}{[0.129]^1 \cdot [0.5]^2 + [0.129]^1 \cdot [0.1562]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.0535]^2}$$

$$= \frac{0.00315}{0.037} = 0.085.$$

$$P^k_{(2,4)} = \frac{[0.129]^1 \cdot [0.0735]^2}{[0.129]^1 \cdot [0.5]^2 + [0.129]^1 \cdot [0.1562]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000696}{0.037} = 0.0188.$$

$$P^k_{(2,5)} = \frac{[0.129]^1 \cdot [0.0677]^2}{[0.129]^1 \cdot [0.5]^2 + [0.129]^1 \cdot [0.1562]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.0535]^2}$$

$$= \frac{0.00059}{0.037} = 0.0159.$$

$$P^k_{(2,6)} = \frac{[0.129]^1 \cdot [0.0535]^2}{[0.129]^1 \cdot [0.5]^2 + [0.129]^1 \cdot [0.1562]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000369}{0.037} = 0.00997.$$

Jalur kesatu dari semut kedua adalah 2 – 1.

$$P^k_{(1,3)} = \frac{[0.129]^1 \cdot [0.128]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0485]^2}$$

$$= \frac{0.00211}{0.003418} = 0.617. \text{ (Terpilih)}$$

$$P^k_{(1,4)} = \frac{[0.129]^1 \cdot [0.0644]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000535}{0.003418} = 0.156.$$

$$P^k_{(1,5)} = \frac{[0.129]^1 \cdot [0.0604]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0485]^2}$$

$$= \frac{0.00047}{0.003418} = 0.137.$$

$$P^k_{(1,6)} = \frac{[0.129]^1 \cdot [0.0485]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000303}{0.003418} = 0.0886.$$

Jalur kedua dari semut kedua adalah 2 – 1 – 3.

$$P^k_{(3,4)} = \frac{[0.129]^1 \cdot [0.1104]^2}{[0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00157}{0.003747} = 0.419. \text{ (Terpilih)}$$

$$P^k_{(3,5)} = \frac{[0.129]^1 \cdot [0.1085]^2}{[0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00152}{0.003747} = 0.405.$$

$$P^k_{(3,6)} = \frac{[0.129]^1 \cdot [0.0714]^2}{[0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.000657}{0.003747} = 0.175.$$

Jalur ketiga dari semut kedua adalah 2 – 1 – 3 – 4.

$$P^k_{(4,5)} = \frac{[0.129]^1 \cdot [0.3333]^2}{[0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.0143}{0.01926} = 0.742. \text{ (Terpilih)}$$

$$P^k_{(4,6)} = \frac{[0.129]^1 \cdot [0.1961]^2}{[0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.00496}{0.01926} = 0.257.$$

Jalur keempat dari semut kedua adalah 2 – 1 – 3 – 4 – 5.



$$P^k_{(5,6)} = \frac{[0.129]^1 \cdot [0.1857]^2}{[0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00445}{0.00445} = 1. \text{ (Terpilih)}$$

Jalur kelima dari semut kedua adalah 2 – 1 – 3 – 4 – 5 – 6.

Jadi, jalur semut kedua adalah 2 – 1 – 3 – 4 – 5 – 6 – 2 dengan panjang jalur adalah 45.9323.

\*Semut ketiga

$$P^k_{(3,1)} = \frac{[0.129]^1 \cdot [0.128]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.1562]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00211}{0.009} = 0.234.$$

$$P^k_{(3,2)} = \frac{[0.129]^1 \cdot [0.1562]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.1562]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00315}{0.009} = 0.35. \text{ (Terpilih)}$$

$$P^k_{(3,4)} = \frac{[0.129]^1 \cdot [0.1104]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.1562]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00157}{0.009} = 0.174.$$

$$P^k_{(3,5)} = \frac{[0.129]^1 \cdot [0.1085]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.1562]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00152}{0.009} = 0.168.$$

$$P^k_{(3,6)} = \frac{[0.129]^1 \cdot [0.0714]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.1562]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.000657}{0.009} = 0.073.$$

Jalur kesatu dari semut ketiga adalah 3 – 2.

$$P^k_{(2,1)} = \frac{[0.129]^1 \cdot [0.5]^2}{[0.129]^1 \cdot [0.5]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.0535]^2}$$

$$= \frac{0.03225}{0.034} = 0.948. \text{ (Terpilih)}$$

$$P^k_{(2,4)} = \frac{[0.129]^1 \cdot [0.0735]^2}{[0.129]^1 \cdot [0.5]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000696}{0.034} = 0.02.$$

$$P^k_{(2,5)} = \frac{[0.129]^1 \cdot [0.0677]^2}{[0.129]^1 \cdot [0.5]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.0535]^2}$$

$$= \frac{0.00059}{0.034} = 0.017.$$

$$P^k_{(2,6)} = \frac{[0.129]^1 \cdot [0.0535]^2}{[0.129]^1 \cdot [0.5]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000369}{0.034} = 0.01.$$

Jalur kedua dari semut ketiga adalah 3 – 2 – 1.

$$P^k_{(1,4)} = \frac{[0.129]^1 \cdot [0.0644]^2}{[0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000535}{0.001308} = 0.409. \text{ (Terpilih)}$$

$$P^k_{(1,5)} = \frac{[0.129]^1 \cdot [0.0604]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0485]^2}$$

$$= \frac{0.00047}{0.001308} = 0.359.$$

$$P^k_{(1,6)} = \frac{[0.129]^1 \cdot [0.0485]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000303}{0.001308} = 0.231.$$

Jalur ketiga dari semut ketiga adalah 3 – 2 – 1 – 4.

$$P^k_{(4,5)} = \frac{[0.129]^1 \cdot [0.3333]^2}{[0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.0143}{0.01926} = 0.742. \text{ (Terpilih)}$$

$$P^k_{(4,6)} = \frac{[0.129]^1 \cdot [0.1961]^2}{[0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.00496}{0.01926} = 0.257.$$

Jalur keempat dari semut ketiga adalah 3 – 2 – 1 – 4 – 5.

$$P^k_{(5,6)} = \frac{[0.129]^1 \cdot [0.1857]^2}{[0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00445}{0.00445} = 1. \text{ (Terpilih)}$$

Jalur kelima dari semut ketiga adalah 3 – 2 – 1 – 4 – 5 – 6.

Jadi, jalur semut ketiga adalah 3 – 2 – 1 – 4 – 5 – 6 – 3 dengan panjang jalur adalah 46.3125.

\*Semut keempat

$$P_{(4,1)}^k = \frac{[0.129]^1 \cdot [0.0644]^2}{[0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.000535}{0.022} = 0.0243.$$

$$P_{(4,2)}^k = \frac{[0.129]^1 \cdot [0.0735]^2}{[0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.000696}{0.022} = 0.0316.$$

$$P_{(4,3)}^k = \frac{[0.129]^1 \cdot [0.1104]^2}{[0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.00157}{0.022} = 0.0713.$$

$$P_{(4,5)}^k = \frac{[0.129]^1 \cdot [0.3333]^2}{[0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.0143}{0.022} = 0.65. \text{ (Terpilih)}$$

$$P_{(4,6)}^k = \frac{[0.129]^1 \cdot [0.1961]^2}{[0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.00496}{0.022} = 0.225.$$

Jalur kesatu dari semut keempat adalah 4 – 5.

$$P_{(5,1)}^k = \frac{[0.129]^1 \cdot [0.0604]^2}{[0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00047}{0.007} = 0.067.$$

$$P_{(5,2)}^k = \frac{[0.129]^1 \cdot [0.0677]^2}{[0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00059}{0.007} = 0.084.$$

$$P_{(5,3)}^k = \frac{[0.129]^1 \cdot [0.1085]^2}{[0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00152}{0.007} = 0.217.$$

$$P_{(5,6)}^k = \frac{[0.129]^1 \cdot [0.1857]^2}{[0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00445}{0.007} = 0.635. \text{ (Terpilih)}$$

Jalur kedua dari semut keempat adalah 4 – 5 – 6.

$$P_{(6,1)}^k = \frac{[0.129]^1 \cdot [0.0485]^2}{[0.129]^1 \cdot [0.0485]^2 + [0.129]^1 \cdot [0.0535]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.000303}{0.001329} = 0.228.$$

$$P_{(6,2)}^k = \frac{[0.129]^1 \cdot [0.0535]^2}{[0.129]^1 \cdot [0.0485]^2 + [0.129]^1 \cdot [0.0535]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.000369}{0.001329} = 0.277.$$

$$P_{(6,3)}^k = \frac{[0.129]^1 \cdot [0.0714]^2}{[0.129]^1 \cdot [0.0485]^2 + [0.129]^1 \cdot [0.0535]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.000657}{0.001329} = 0.494. \text{ (Terpilih)}$$

Jalur ketiga dari semut keempat adalah 4 – 5 – 6 – 3.

$$P_{(3,1)}^k = \frac{[0.129]^1 \cdot [0.128]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.1562]^2}$$

$$= \frac{0.00211}{0.00526} = 0.401.$$

$$P_{(3,2)}^k = \frac{[0.129]^1 \cdot [0.1562]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.1562]^2}$$

$$= \frac{0.00315}{0.00526} = 0.598. \text{ (Terpilih)}$$

Jalur keempat dari semut keempat adalah 4 – 5 – 6 – 3 – 2.

$$P_{(2,1)}^k = \frac{[0.129]^1 \cdot [0.5]^2}{[0.129]^1 \cdot [0.5]^2}$$

$$= \frac{0.03225}{0.03225} = 1. \text{ (Terpilih)}$$

Jalur kelima dari semut keempat adalah 4 – 5 – 6 – 3 – 2 – 1 .

Jadi, jalur semut keempat adalah 4 – 5 – 6 – 3 – 2 – 1 – 4 dengan panjang jalur adalah 46.3125.

\*Semut kelima

$$P_{(5,1)}^k = \frac{[0.129]^1 \cdot [0.0604]^2}{[0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00047}{0.02133} = 0.022.$$

$$P_{(5,2)}^k = \frac{[0.129]^1 \cdot [0.0677]^2}{[0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00059}{0.02133} = 0.027$$

$$P^k_{(5,3)} = \frac{[0.129]^1 \cdot [0.1085]^2}{[0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00152}{0.02133} = 0.071.$$

$$P^k_{(5,4)} = \frac{[0.129]^1 \cdot [0.3333]^2}{[0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.0143}{0.02133} = 0.67. \text{ (Terpilih)}$$

$$P^k_{(5,6)} = \frac{[0.129]^1 \cdot [0.1857]^2}{[0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.1085]^2 + [0.129]^1 \cdot [0.3333]^2 + [0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00445}{0.02133} = 0.208.$$

Jalur kesatu dari semut kelima adalah 5 – 4.

$$P^k_{(4,1)} = \frac{[0.129]^1 \cdot [0.0644]^2}{[0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.000535}{0.07761} = 0.0689.$$

$$P^k_{(4,2)} = \frac{[0.129]^1 \cdot [0.0735]^2}{[0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.000696}{0.07761} = 0.0896.$$

$$P^k_{(4,3)} = \frac{[0.129]^1 \cdot [0.1104]^2}{[0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.00157}{0.07761} = 0.0202.$$

$$P^k_{(4,6)} = \frac{[0.129]^1 \cdot [0.1961]^2}{[0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.1961]^2}$$

$$= \frac{0.00496}{0.07761} = 0.639. \text{ (Terpilih)}$$

Jalur kedua dari semut kelima adalah 5 – 4 – 6.

$$P^k_{(6,1)} = \frac{[0.129]^1 \cdot [0.0485]^2}{[0.129]^1 \cdot [0.0485]^2 + [0.129]^1 \cdot [0.0535]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.000303}{0.001329} = 0.228.$$

$$P^k_{(6,2)} = \frac{[0.129]^1 \cdot [0.0535]^2}{[0.129]^1 \cdot [0.0485]^2 + [0.129]^1 \cdot [0.0535]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.000369}{0.001329} = 0.277.$$

$$P^k_{(6,3)} = \frac{[0.129]^1 \cdot [0.0714]^2}{[0.129]^1 \cdot [0.0485]^2 + [0.129]^1 \cdot [0.0535]^2 + [0.129]^1 \cdot [0.0714]^2}$$

$$= \frac{0.000657}{0.001329} = 0.494. \text{ (Terpilih)}$$

Jalur ketiga dari semut kelima adalah 5 – 4 – 6 – 3.

$$P^k_{(3,1)} = \frac{[0.129]^1 \cdot [0.128]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.1562]^2}$$

$$= \frac{0.00211}{0.00526} = 0.401.$$

$$P^k_{(3,2)} = \frac{[0.129]^1 \cdot [0.1562]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.1562]^2}$$

$$= \frac{0.00315}{0.00526} = 0.598. \text{ (Terpilih)}$$

Jalur keempat dari semut kelima adalah 5 – 4 – 6 – 3 – 2.



$$P_{(2,1)}^k = \frac{[0.129]^1 \cdot [0.5]^2}{[0.129]^1 \cdot [0.5]^2}$$

$$= \frac{0.03225}{0.03225} = 1. \text{ (Terpilih)}$$

Jalur kelima dari semut kelima adalah 5 – 4 – 6 – 3 – 2 – 1.

Jadi, jalur semut kelima adalah dengan 5 – 4 – 6 – 3 – 2 – 1 – 5 dengan panjang jalur adalah 47.0551.

\*Semut keenam

$$P_{(6,1)}^k = \frac{[0.129]^1 \cdot [0.0485]^2}{[0.129]^1 \cdot [0.0485]^2 + [0.129]^1 \cdot [0.0535]^2 + [0.129]^1 \cdot [0.0714]^2 + [0.129]^1 \cdot [0.1961]^2 + [0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.000303}{0.001074} = 0.028.$$

$$P_{(6,2)}^k = \frac{[0.129]^1 \cdot [0.0535]^2}{[0.129]^1 \cdot [0.0485]^2 + [0.129]^1 \cdot [0.0535]^2 + [0.129]^1 \cdot [0.0714]^2 + [0.129]^1 \cdot [0.1961]^2 + [0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.000369}{0.001074} = 0.034.$$

$$P_{(6,3)}^k = \frac{[0.129]^1 \cdot [0.0714]^2}{[0.129]^1 \cdot [0.0485]^2 + [0.129]^1 \cdot [0.0535]^2 + [0.129]^1 \cdot [0.0714]^2 + [0.129]^1 \cdot [0.1961]^2 + [0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.000657}{0.001074} = 0.061.$$

$$P_{(6,4)}^k = \frac{[0.129]^1 \cdot [0.1961]^2}{[0.129]^1 \cdot [0.0485]^2 + [0.129]^1 \cdot [0.0535]^2 + [0.129]^1 \cdot [0.0714]^2 + [0.129]^1 \cdot [0.1961]^2 + [0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00496}{0.001074} = 0.461. \text{ (Terpilih)}$$

$$P^k_{(6,5)} = \frac{[0.129]^1 \cdot [0.1857]^2}{[0.129]^1 \cdot [0.0485]^2 + [0.129]^1 \cdot [0.0535]^2 + [0.129]^1 \cdot [0.0714]^2 + [0.129]^1 \cdot [0.1961]^2 + [0.129]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00445}{0.001074} = 0.414.$$

Jalur kesatu dari semut keenam adalah 6 – 4.

$$P^k_{(4,1)} = \frac{[0.129]^1 \cdot [0.0644]^2}{[0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.3333]^2}$$

$$= \frac{0.000535}{0.0171} = 0.0312.$$

$$P^k_{(4,2)} = \frac{[0.129]^1 \cdot [0.0735]^2}{[0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.3333]^2}$$

$$= \frac{0.000696}{0.0171} = 0.0407.$$

$$P^k_{(4,3)} = \frac{[0.129]^1 \cdot [0.1104]^2}{[0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.3333]^2}$$

$$= \frac{0.00157}{0.0171} = 0.0918.$$

$$P^k_{(4,5)} = \frac{[0.129]^1 \cdot [0.3333]^2}{[0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0735]^2 + [0.129]^1 \cdot [0.1104]^2 + [0.129]^1 \cdot [0.3333]^2}$$

$$= \frac{0.0143}{0.0171} = 0.836. \text{ (Terpilih)}$$

Jalur kedua dari semut keenam adalah 6 – 4 – 5.

$$P^k_{(5,1)} = \frac{[0.129]^1 \cdot [0.0604]^2}{[0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.1085]^2}$$

$$= \frac{0.00047}{0.00258} = 0.182.$$

$$P^k_{(5,2)} = \frac{[0.129]^1 \cdot [0.0677]^2}{[0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.1085]^2}$$

$$= \frac{0.00059}{0.00258} = 0.228$$

$$P^k_{(5,3)} = \frac{[0.129]^1 \cdot [0.1085]^2}{[0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0677]^2 + [0.129]^1 \cdot [0.1085]^2}$$

$$= \frac{0.00152}{0.00258} = 0.589. \text{ (Terpilih)}$$

Jalur ketiga dari semut keenam adalah 6 – 4 – 5 – 3.

$$P^k_{(3,1)} = \frac{[0.129]^1 \cdot [0.128]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.1562]^2}$$

$$= \frac{0.00211}{0.00526} = 0.401.$$

$$P^k_{(3,2)} = \frac{[0.129]^1 \cdot [0.1562]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.1562]^2}$$

$$= \frac{0.00315}{0.00526} = 0.598. \text{ (Terpilih)}$$

Jalur keempat dari semut keenam adalah 6 – 4 – 5 – 3 – 2.

$$P^k_{(2,1)} = \frac{[0.129]^1 \cdot [0.5]^2}{[0.129]^1 \cdot [0.5]^2}$$

$$= \frac{0.03225}{0.03225} = 1. \text{ (Terpilih)}$$

Jalur kelima dari semut keenam adalah 6 – 4 – 5 – 3 – 2 – 1.

Jadi, jalur semut keenam adalah dengan 6 – 4 – 5 – 3 – 2 – 1 – 6 dengan panjang jalur adalah 46.3371.

➤ Tabu(tempat menyimpan jalur semut) =

Semut pertama	1 – 2 – 3 – 4 – 5 – 6 – 1	dengan panjang jalur	46.4592.
Semut kedua	2 – 1 – 3 – 4 – 5 – 6 – 2	dengan panjang jalur	45.9323.
Semut ketiga	3 – 2 – 1 – 4 – 5 – 6 – 3	dengan panjang jalur	46.3125.
Semut keempat	4 – 5 – 6 – 3 – 2 – 1 – 4	dengan panjang jalur	46.3125.
Semut kelima	5 – 4 – 6 – 3 – 2 – 1 – 5	dengan panjang jalur	47.0551.
Semut keenam	6 – 4 – 5 – 3 – 2 – 1 – 6	dengan panjang jalur	46.3371.

➤ Hitung feromon setiap semut dengan menggunakan rumus

$\Delta\tau_{ij}^k = 1/L^k$ , dimana  $L^k$  adalah panjang jalur.

- Semut pertama =  $1 / 46.4592 = 0.02152$
- Semut kedua =  $1 / 45.9323 = 0.02177$
- Semut ketiga =  $1 / 46.3125 = 0.0216$
- Semut keempat =  $1 / 46.3125 = 0.0216$
- Semut kelima =  $1 / 47.0551 = 0.02125$
- Semut keenam =  $1 / 46.3371 = 0.02158$

$\Delta\tau_{ij}^k =$

0	0.02152	0.02177	0.0432	0.02125	0.02158
0.1078	0	0.02152	0	0	0
0	0.08603	0	0.04329	0	0
0	0	0	0	0.10807	0.02125
0	0	0.02158	0.02125	0	0.08649
0.02152	0.02177	0.03445	0.02158	0	0

➤ Lakukan update jumlah feromon menggunakan persamaan II.2

$$\tau_{i,j}(t+1) = (1-\rho) \cdot \tau_{i,j}(t) + \sum_{k=1}^m [\Delta\tau_{ij}^k(t)]$$

$$= (1-0.5) \cdot (0.129) + \begin{pmatrix} 0 & 0.02152 & 0.02177 & 0.0432 & 0.02125 & 0.02158 \\ 0.1078 & 0 & 0.02152 & 0 & 0 & 0 \\ 0 & 0.08603 & 0 & 0.04329 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.10807 & 0.02125 \\ 0 & 0 & 0.02158 & 0.02125 & 0 & 0.08649 \\ 0.02152 & 0.02177 & 0.06445 & 0.02158 & 0 & 0 \end{pmatrix}$$

$$= \begin{pmatrix} 0.0646 & 0.08612 & 0.08637 & 0.1078 & 0.08585 & 0.08618 \\ 0.1724 & 0.0646 & 0.08612 & 0.0646 & 0.0646 & 0.0646 \\ 0.0646 & 0.15063 & 0.0646 & 0.10789 & 0.0646 & 0.0646 \\ 0.0646 & 0.0646 & 0.0646 & 0.0646 & 0.17267 & 0.08585 \\ 0.0646 & 0.0646 & 0.08618 & 0.08585 & 0.0646 & 0.15109 \\ 0.08612 & 0.8637 & 0.12905 & 0.08618 & 0.0646 & 0.0646 \end{pmatrix}$$

➤ Setelah dilakukan update feromon, tentukan kembali jalur yang akan dipilih sampai didapat jalur terpendek

- Semut pertama

$$P^k_{(1,2)} = \frac{[0.08612]^1 \cdot [0.5]^2}{[0.08612]^1 \cdot [0.5]^2 + [0.08637]^1 \cdot [0.128]^2 + [0.1078]^1 \cdot [0.0644]^2 + [0.08585]^1 \cdot [0.0604]^2 + [0.08618]^1 \cdot [0.0485]^2}$$

$$= \frac{0.02153}{0.023908} = 0.9. \text{ (Terpilih)}$$

$$P^k_{(1,3)} = \frac{[0.08637]^1 \cdot [0.128]^2}{[0.08612]^1 \cdot [0.5]^2 + [0.08637]^1 \cdot [0.128]^2 + [0.1078]^1 \cdot [0.0644]^2 + [0.08585]^1 \cdot [0.0604]^2 + [0.08618]^1 \cdot [0.0485]^2}$$

$$= \frac{0.001415}{0.023908} = 0.0592.$$

$$P^k_{(1,4)} = \frac{[0.1078]^1 \cdot [0.0644]^2}{[0.08612]^1 \cdot [0.5]^2 + [0.08637]^1 \cdot [0.128]^2 + [0.1078]^1 \cdot [0.0644]^2 + [0.08585]^1 \cdot [0.0604]^2 + [0.08618]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000447}{0.023908} = 0.0187.$$

$$P^k_{(1,5)} = \frac{[0.08585]^1 \cdot [0.0604]^2}{[0.08612]^1 \cdot [0.5]^2 + [0.08637]^1 \cdot [0.128]^2 + [0.1078]^1 \cdot [0.0644]^2 + [0.08585]^1 \cdot [0.0604]^2 + [0.08618]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000313}{0.023908} = 0.0131.$$

$$P^k_{(1,6)} = \frac{[0.08618]^1 \cdot [0.0485]^2}{[0.08612]^1 \cdot [0.5]^2 + [0.08637]^1 \cdot [0.128]^2 + [0.1078]^1 \cdot [0.0644]^2 + [0.08585]^1 \cdot [0.0604]^2 + [0.08618]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000203}{0.023908} = 0.0085.$$

Jalur pertama dari semut pertama adalah 1 – 2.

$$P^k_{(2,3)} = \frac{[0.08612]^1 \cdot [0.1562]^2}{[0.08612]^1 \cdot [0.1562]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.0646]^1 \cdot [0.0535]^2}$$

$$= \frac{0.0021}{0.00293} = 0.716. \text{ (Terpilih)}$$

$$P^k_{(2,4)} = \frac{[0.0646]^1 \cdot [0.0735]^2}{[0.08612]^1 \cdot [0.1562]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.0646]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000349}{0.00293} = 0.119.$$

$$P^k_{(2,5)} = \frac{[0.0646]^1 \cdot [0.0677]^2}{[0.08612]^1 \cdot [0.1562]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.0646]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000296}{0.00293} = 0.101.$$

$$P^k_{(2,6)} = \frac{[0.0646]^1 \cdot [0.0535]^2}{[0.08612]^1 \cdot [0.1562]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.0646]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000185}{0.00293} = 0.063.$$

Jalur kedua dari semut pertama adalah 1 – 2 – 3.

$$P^k_{(3,4)} = \frac{[0.10789]^1 \cdot [0.1104]^2}{[0.10789]^1 \cdot [0.1104]^2 + [0.0646]^1 \cdot [0.1085]^2 + [0.0646]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00131}{0.0024} = 0.546.$$

$$P^k_{(3,5)} = \frac{[0.0646]^1 \cdot [0.1085]^2}{[0.10789]^1 \cdot [0.1104]^2 + [0.0646]^1 \cdot [0.1085]^2 + [0.0646]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00076}{0.0024} = 0.316. \text{ (Terpilih)}$$

$$P^k_{(3,6)} = \frac{[0.0646]^1 \cdot [0.0714]^2}{[0.10789]^1 \cdot [0.1104]^2 + [0.0646]^1 \cdot [0.1085]^2 + [0.0646]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00033}{0.0024} = 0.1375.$$

Jalur ketiga dari semut pertama adalah 1 – 2 – 3 – 5.

$$P_{(5,4)}^k = \frac{[0.08585]^1 \cdot [0.3333]^2}{[0.08585]^1 \cdot [0.3333]^2 + [0.15109]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00953}{0.01474} = 0.646.$$

$$P_{(5,6)}^k = \frac{[0.15109]^1 \cdot [0.1857]^2}{[0.08585]^1 \cdot [0.3333]^2 + [0.15109]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00521}{0.01474} = 0.353. \text{ (Terpilih)}$$

Jalur keempat dari semut pertama adalah 1 – 2 – 3 – 5 – 6.

$$P_{(6,4)}^k = \frac{[0.08618]^1 \cdot [0.1961]^2}{[0.08618]^1 \cdot [0.1961]^2}$$

$$= \frac{0.00331}{0.00331} = 1. \text{ (Terpilih)}$$

Jalur kelima dari semut pertama adalah 1 – 2 – 3 – 5 – 6 – 4 – 1.

Jadi, jalur semut pertama adalah 1 – 2 – 3 – 5 – 6 – 4 – 1 dengan panjang jalur adalah 43.6310.

\* Semut kedua

$$P_{(2,1)}^k = \frac{[0.1724]^1 \cdot [0.5]^2}{[0.1724]^1 \cdot [0.5]^2 + [0.08612]^1 \cdot [0.1562]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.0646]^1 \cdot [0.0535]^2}$$

$$= \frac{0.0431}{0.04603} = 0.936. \text{ (Terpilih)}$$

$$P_{(2,3)}^k = \frac{[0.08612]^1 \cdot [0.1562]^2}{[0.1724]^1 \cdot [0.5]^2 + [0.08612]^1 \cdot [0.1562]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.0646]^1 \cdot [0.0535]^2}$$

$$= \frac{0.0021}{0.04603} = 0.0456.$$

$$P^k_{(2,4)} = \frac{[0.0646]^1 \cdot [0.0735]^2}{[0.1724]^1 \cdot [0.5]^2 + [0.08612]^1 \cdot [0.1562]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.0646]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000349}{0.04603} = 0.0076.$$

$$P^k_{(2,5)} = \frac{[0.0646]^1 \cdot [0.0677]^2}{[0.1724]^1 \cdot [0.5]^2 + [0.08612]^1 \cdot [0.1562]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.0646]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000296}{0.04603} = 0.0064.$$

$$P^k_{(2,6)} = \frac{[0.0646]^1 \cdot [0.0535]^2}{[0.1724]^1 \cdot [0.5]^2 + [0.08612]^1 \cdot [0.1562]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.0646]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000185}{0.04603} = 0.004.$$

Jalur kesatu dari semut kedua adalah 2 – 1.

$$P^k_{(1,3)} = \frac{[0.08637]^1 \cdot [0.128]^2}{[0.08637]^1 \cdot [0.128]^2 + [0.1078]^1 \cdot [0.0644]^2 + [0.08585]^1 \cdot [0.0604]^2 + [0.08618]^1 \cdot [0.0485]^2}$$

$$= \frac{0.001415}{0.002378} = 0.595. \text{ (Terpilih)}$$

$$P^k_{(1,4)} = \frac{[0.1078]^1 \cdot [0.0644]^2}{[0.08637]^1 \cdot [0.128]^2 + [0.1078]^1 \cdot [0.0644]^2 + [0.08585]^1 \cdot [0.0604]^2 + [0.08618]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000447}{0.002378} = 0.188.$$

$$P^k_{(1,5)} = \frac{[0.08585]^1 \cdot [0.0604]^2}{[0.08637]^1 \cdot [0.128]^2 + [0.1078]^1 \cdot [0.0644]^2 + [0.08585]^1 \cdot [0.0604]^2 + [0.08618]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000313}{0.002378} = 0.131.$$



$$P^k_{(1,6)} = \frac{[0.8618]^1 \cdot [0.0485]^2}{[0.08637]^1 \cdot [0.128]^2 + [0.1078]^1 \cdot [0.0644]^2 + [0.08585]^1 \cdot [0.0604]^2 + [0.08618]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000203}{0.002378} = 0.085.$$

Jalur kedua dari semut kedua adalah 2 – 1 – 3.

$$P^k_{(3,4)} = \frac{[0.10789]^1 \cdot [0.1104]^2}{[0.10789]^1 \cdot [0.1104]^2 + [0.0646]^1 \cdot [0.1085]^2 + [0.0646]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00131}{0.0024} = 0.546.$$

$$P^k_{(3,5)} = \frac{[0.0646]^1 \cdot [0.1085]^2}{[0.10789]^1 \cdot [0.1104]^2 + [0.0646]^1 \cdot [0.1085]^2 + [0.0646]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00076}{0.0024} = 0.316. \text{ (Terpilih)}$$

$$P^k_{(3,6)} = \frac{[0.0646]^1 \cdot [0.0714]^2}{[0.10789]^1 \cdot [0.1104]^2 + [0.0646]^1 \cdot [0.1085]^2 + [0.0646]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00033}{0.0024} = 0.1375.$$

Jalur ketiga dari semut kedua adalah 2 – 1 – 3 – 5.

$$P^k_{(5,4)} = \frac{[0.08585]^1 \cdot [0.3333]^2}{[0.08585]^1 \cdot [0.3333]^2 + [0.15109]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00953}{0.01474} = 0.646.$$

$$P^k_{(5,6)} = \frac{[0.15109]^1 \cdot [0.1857]^2}{[0.08585]^1 \cdot [0.3333]^2 + [0.15109]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00521}{0.01474} = 0.353. \text{ (Terpilih)}$$

Jalur keempat dari semut kedua adalah 2 – 1 – 3 – 5 – 6.

$$P_{(6,4)}^k = \frac{[0.08618]^1 \cdot [0.1961]^2}{[0.08618]^1 \cdot [0.1961]^2}$$

$$= \frac{0.00331}{0.00331} = 1. \text{ (Terpilih)}$$

Jalur kelima dari semut kedua adalah 2 – 1 – 3 – 5 – 6 – 4.

Jadi, jalur semut kedua adalah 2 – 1 – 3 – 5 – 6 – 4 – 2 dengan panjang jalur adalah 43.1154.

\*Semut ketiga

$$P_{(3,1)}^k = \frac{[0.0646]^1 \cdot [0.128]^2}{[0.0646]^1 \cdot [0.128]^2 + [0.15063]^1 \cdot [0.1562]^2 + [0.10789]^1 \cdot [0.1104]^2 + [0.0646]^1 \cdot [0.1085]^2 + [0.0646]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00106}{0.00713} = 0.148.$$

$$P_{(3,2)}^k = \frac{[0.15063]^1 \cdot [0.1562]^2}{[0.0646]^1 \cdot [0.128]^2 + [0.15063]^1 \cdot [0.1562]^2 + [0.10789]^1 \cdot [0.1104]^2 + [0.0646]^1 \cdot [0.1085]^2 + [0.0646]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00367}{0.00713} = 0.514. \text{ (Terpilih)}$$

$$P_{(3,4)}^k = \frac{[0.10789]^1 \cdot [0.1104]^2}{[0.0646]^1 \cdot [0.128]^2 + [0.15063]^1 \cdot [0.1562]^2 + [0.10789]^1 \cdot [0.1104]^2 + [0.0646]^1 \cdot [0.1085]^2 + [0.0646]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00131}{0.00713} = 0.183.$$

$$P_{(3,5)}^k = \frac{[0.0646]^1 \cdot [0.1085]^2}{[0.0646]^1 \cdot [0.128]^2 + [0.15063]^1 \cdot [0.1562]^2 + [0.10789]^1 \cdot [0.1104]^2 + [0.0646]^1 \cdot [0.1085]^2 + [0.0646]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00076}{0.00713} = 0.106.$$

$$P^k_{(3,6)} = \frac{[0.0646]^1 \cdot [0.0714]^2}{[0.0646]^1 \cdot [0.128]^2 + [0.15063]^1 \cdot [0.1562]^2 + [0.10789]^1 \cdot [0.1104]^2 + [0.0646]^1 \cdot [0.1085]^2 + [0.0646]^1 \cdot [0.0714]^2}$$

$$= \frac{0.00033}{0.00713} = 0.046.$$

Jalur kesatu dari semut ketiga adalah 3 – 2.

$$P^k_{(2,1)} = \frac{[0.1724]^1 \cdot [0.5]^2}{[0.1724]^1 \cdot [0.5]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.0646]^1 \cdot [0.0535]^2}$$

$$= \frac{0.0431}{0.04393} = 0.981. \text{ (Terpilih)}$$

$$P^k_{(2,4)} = \frac{[0.0646]^1 \cdot [0.0735]^2}{[0.1724]^1 \cdot [0.5]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.0646]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000349}{0.04393} = 0.008.$$

$$P^k_{(2,5)} = \frac{[0.0646]^1 \cdot [0.0677]^2}{[0.1724]^1 \cdot [0.5]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.0646]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000296}{0.04393} = 0.0067.$$

$$P^k_{(2,6)} = \frac{[0.0646]^1 \cdot [0.0535]^2}{[0.1724]^1 \cdot [0.5]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.0646]^1 \cdot [0.0535]^2}$$

$$= \frac{0.000185}{0.04393} = 0.0042.$$

Jalur kedua dari semut ketiga adalah 3 – 2 – 1.

$$P^k_{(1,4)} = \frac{[0.1078]^1 \cdot [0.0644]^2}{[0.1078]^1 \cdot [0.0644]^2 + [0.08585]^1 \cdot [0.0604]^2 + [0.08618]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000447}{0.000963} = 0.464. \text{ (Terpilih)}$$

$$P^k_{(1,5)} = \frac{[0.08585]^1 \cdot [0.0604]^2}{[0.1078]^1 \cdot [0.0644]^2 + [0.08585]^1 \cdot [0.0604]^2 + [0.08618]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000313}{0.000963} = 0.325.$$

$$P^k_{(1,6)} = \frac{[0.08618]^1 \cdot [0.0485]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.0644]^2 + [0.129]^1 \cdot [0.0604]^2 + [0.129]^1 \cdot [0.0485]^2}$$

$$= \frac{0.000203}{0.000963} = 0.210.$$

Jalur ketiga dari semut ketiga adalah 3 – 2 – 1 – 4.

$$P^k_{(4,5)} = \frac{[0.17267]^1 \cdot [0.3333]^2}{[0.17267]^1 \cdot [0.3333]^2 + [0.08585]^1 \cdot [0.1961]^2}$$

$$= \frac{0.0192}{0.0522} = 0.368.$$

$$P^k_{(4,6)} = \frac{[0.08585]^1 \cdot [0.1961]^2}{[0.17267]^1 \cdot [0.3333]^2 + [0.08585]^1 \cdot [0.1961]^2}$$

$$= \frac{0.033}{0.0522} = 0.632. \text{ (Terpilih)}$$

Jalur keempat dari semut ketiga adalah 3 – 2 – 1 – 4 – 6.

$$P^k_{(6,5)} = \frac{[0.0646]^1 \cdot [0.1857]^2}{[0.0646]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00223}{0.00223} = 1. \text{ (Terpilih)}$$

Jalur kelima dari semut ketiga adalah 3 – 2 – 1 – 4 – 6 – 5.

Jadi, jalur semut ketiga adalah 3 – 2 – 1 – 4 – 6 – 5 – 3 dengan panjang jalur adalah 43.6310.

\*Semut keempat

$$P^k_{(4,1)} = \frac{[0.0646]^1 \cdot [0.0644]^2}{[0.0646]^1 \cdot [0.0644]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.1104]^2 + [0.17267]^1 \cdot [0.3333]^2 + [0.08585]^1 \cdot [0.1961]^2}$$

$$= \frac{0.000268}{0.0536} = 0.005.$$

$$P^k_{(4,2)} = \frac{[0.0646]^1 \cdot [0.0735]^2}{[0.0646]^1 \cdot [0.0644]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.1104]^2 + [0.17267]^1 \cdot [0.3333]^2 + [0.08585]^1 \cdot [0.1961]^2}$$

$$= \frac{0.000349}{0.0536} = 0.0065.$$

$$P^k_{(4,3)} = \frac{[0.0646]^1 \cdot [0.1104]^2}{[0.0646]^1 \cdot [0.0644]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.1104]^2 + [0.17267]^1 \cdot [0.3333]^2 + [0.08585]^1 \cdot [0.1961]^2}$$

$$= \frac{0.000787}{0.0536} = 0.0146.$$

$$P^k_{(4,5)} = \frac{[0.17267]^1 \cdot [0.3333]^2}{[0.0646]^1 \cdot [0.0644]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.1104]^2 + [0.17267]^1 \cdot [0.3333]^2 + [0.08585]^1 \cdot [0.1961]^2}$$

$$= \frac{0.0192}{0.0536} = 0.358.$$

$$P^k_{(4,6)} = \frac{[0.08585]^1 \cdot [0.1961]^2}{[0.0646]^1 \cdot [0.0644]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.1104]^2 + [0.17267]^1 \cdot [0.3333]^2 + [0.08585]^1 \cdot [0.1961]^2}$$

$$= \frac{0.033}{0.0536} = 0.615. \text{ (Terpilih)}$$

Jalur kesatu dari semut keempat adalah 4 – 6.

$$P^k_{(6,1)} = \frac{[0.08612]^1 \cdot [0.0485]^2}{[0.08612]^1 \cdot [0.0485]^2 + [0.08637]^1 \cdot [0.0535]^2 + [0.12905]^1 \cdot [0.0714]^2 + [0.0646]^1 \cdot [0.1857]^2}$$

$$= \frac{0.000202}{0.003336} = 0.0605.$$

$$P_{(6,2)}^k = \frac{[0.08637]^1 \cdot [0.0535]^2}{[0.08612]^1 \cdot [0.0485]^2 + [0.08637]^1 \cdot [0.0535]^2 + [0.12905]^1 \cdot [0.0714]^2 + [0.0646]^1 \cdot [0.1857]^2}$$

$$= \frac{0.000247}{0.003336} = 0.074.$$

$$P_{(6,3)}^k = \frac{[0.12905]^1 \cdot [0.0714]^2}{[0.08612]^1 \cdot [0.0485]^2 + [0.08637]^1 \cdot [0.0535]^2 + [0.12905]^1 \cdot [0.0714]^2 + [0.0646]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00657}{0.003336} = 0.196.$$

$$P_{(6,5)}^k = \frac{[0.0646]^1 \cdot [0.1857]^2}{[0.08612]^1 \cdot [0.0485]^2 + [0.08637]^1 \cdot [0.0535]^2 + [0.12905]^1 \cdot [0.0714]^2 + [0.0646]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00223}{0.003336} = 0.668. \text{ (Terpilih)}$$

Jalur kedua dari semut keempat adalah 4 – 6 – 5.

$$P_{(5,1)}^k = \frac{[0.0646]^1 \cdot [0.0604]^2}{[0.0646]^1 \cdot [0.0604]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.08618]^1 \cdot [0.1085]^2}$$

$$= \frac{0.000235}{0.001541} = 0.152.$$

$$P_{(5,2)}^k = \frac{[0.0646]^1 \cdot [0.0677]^2}{[0.0646]^1 \cdot [0.0604]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.08618]^1 \cdot [0.1085]^2}$$

$$= \frac{0.000296}{0.001541} = 0.192.$$

$$P_{(5,3)}^k = \frac{[0.08618]^1 \cdot [0.1085]^2}{[0.0646]^1 \cdot [0.0604]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.08618]^1 \cdot [0.1085]^2}$$

$$= \frac{0.00101}{0.001541} = 0.6554. \text{ (Terpilih)}$$

Jalur ketiga dari semut keempat adalah 4 – 6 – 5 – 3.

$$P^k_{(3,1)} = \frac{[0.0646]^1 \cdot [0.128]^2}{[0.0646]^1 \cdot [0.128]^2 + [0.15603]^1 \cdot [0.1562]^2}$$

$$= \frac{0.00106}{0.00473} = 0.224.$$

$$P^k_{(3,2)} = \frac{[0.15063]^1 \cdot [0.1562]^2}{[0.0646]^1 \cdot [0.128]^2 + [0.15603]^1 \cdot [0.1562]^2}$$

$$= \frac{0.00367}{0.00473} = 0.775. \text{ (Terpilih)}$$

Jalur keempat dari semut keempat adalah 4 – 6 – 5 – 3 – 2.

$$P^k_{(2,1)} = \frac{[0.1724]^1 \cdot [0.5]^2}{[0.1724]^1 \cdot [0.5]^2}$$

$$= \frac{0.0431}{0.0431} = 1. \text{ (Terpilih)}$$

Jalur kelima dari semut keempat adalah 4 – 6 – 5 – 3 – 2 – 1 .

Jadi, jalur semut keempat adalah 4 – 6 – 5 – 3 – 2 – 1 – 4 dengan panjang jalur adalah 43.6310

\*Semut kelima

$$P^k_{(5,1)} = \frac{[0.0646]^1 \cdot [0.0604]^2}{[0.0646]^1 \cdot [0.0604]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.08618]^1 \cdot [0.1085]^2 + [0.08585]^1 \cdot [0.3333]^2 + [0.15109]^1 \cdot [0.1857]^2}$$

$$= \frac{0.000235}{0.016281} = 0.0144.$$

$$P^k_{(5,2)} = \frac{[0.0646]^1 \cdot [0.0677]^2}{[0.0646]^1 \cdot [0.0604]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.08618]^1 \cdot [0.1085]^2 + [0.08585]^1 \cdot [0.3333]^2 + [0.15109]^1 \cdot [0.1857]^2}$$

$$= \frac{0.000296}{0.016281} = 0.0181.$$

$$P_{(5,3)}^k = \frac{[0.08618]^1 \cdot [0.1085]^2}{[0.0646]^1 \cdot [0.0604]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.08618]^1 \cdot [0.1085]^2 + [0.08585]^1 \cdot [0.3333]^2 + [0.15109]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00101}{0.016281} = 0.062.$$

$$P_{(5,4)}^k = \frac{[0.08585]^1 \cdot [0.3333]^2}{[0.0646]^1 \cdot [0.0604]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.08618]^1 \cdot [0.1085]^2 + [0.08585]^1 \cdot [0.3333]^2 + [0.15109]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00953}{0.016281} = 0.585. \text{ (Terpilih)}$$

$$P_{(5,6)}^k = \frac{[0.15109]^1 \cdot [0.1857]^2}{[0.0646]^1 \cdot [0.0604]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.08618]^1 \cdot [0.1085]^2 + [0.08585]^1 \cdot [0.3333]^2 + [0.15109]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00521}{0.016281} = 0.32.$$

Jalur kesatu dari semut kelima adalah 5 – 4.

$$P_{(4,1)}^k = \frac{[0.0646]^1 \cdot [0.0644]^2}{[0.0646]^1 \cdot [0.0644]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.1104]^2 + [0.08585]^1 \cdot [0.1961]^2}$$

$$= \frac{0.000268}{0.034404} = 0.00779.$$

$$P_{(4,2)}^k = \frac{[0.0646]^1 \cdot [0.0735]^2}{[0.0646]^1 \cdot [0.0644]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.1104]^2 + [0.08585]^1 \cdot [0.1961]^2}$$

$$= \frac{0.000349}{0.034404} = 0.0101.$$

$$P_{(4,3)}^k = \frac{[0.0646]^1 \cdot [0.1104]^2}{[0.0646]^1 \cdot [0.0644]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.1104]^2 + [0.08585]^1 \cdot [0.1961]^2}$$

$$= \frac{0.000787}{0.034404} = 0.0228.$$



$$P^k_{(4,6)} = \frac{[0.08585]^1 \cdot [0.1961]^2}{[0.0646]^1 \cdot [0.0644]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.1104]^2 + [0.08585]^1 \cdot [0.1961]^2}$$

$$= \frac{0.033}{0.034404} = 0.96. \text{ (Terpilih)}$$

Jalur kedua dari semut kelima adalah 5 – 4 – 6.

$$P^k_{(6,1)} = \frac{[0.08612]^1 \cdot [0.0485]^2}{[0.08612]^1 \cdot [0.0485]^2 + [0.08637]^1 \cdot [0.0535]^2 + [0.12905]^1 \cdot [0.0714]^2}$$

$$= \frac{0.000202}{0.001106} = 0.182.$$

$$P^k_{(6,2)} = \frac{[0.08637]^1 \cdot [0.0535]^2}{[0.08612]^1 \cdot [0.0485]^2 + [0.08637]^1 \cdot [0.0535]^2 + [0.12905]^1 \cdot [0.0714]^2}$$

$$= \frac{0.000247}{0.001106} = 0.223.$$

$$P^k_{(6,3)} = \frac{[0.12905]^1 \cdot [0.0714]^2}{[0.08612]^1 \cdot [0.0485]^2 + [0.08637]^1 \cdot [0.0535]^2 + [0.12905]^1 \cdot [0.0714]^2}$$

$$= \frac{0.000657}{0.001106} = 0.594. \text{ (Terpilih)}$$

Jalur ketiga dari semut kelima adalah 5 – 4 – 6 – 3.

$$P^k_{(3,1)} = \frac{[0.0646]^1 \cdot [0.128]^2}{[0.0646]^1 \cdot [0.128]^2 + [0.15063]^1 \cdot [0.1562]^2}$$

$$= \frac{0.00106}{0.00473} = 0.224.$$

$$P^k_{(3,2)} = \frac{[0.129]^1 \cdot [0.1562]^2}{[0.129]^1 \cdot [0.128]^2 + [0.129]^1 \cdot [0.1562]^2}$$

$$= \frac{0.00367}{0.00473} = 0.775. \text{ (Terpilih)}$$

Jalur keempat dari semut kelima adalah 5 – 4 – 6 – 3 – 2.

$$P_{(2,1)}^k = \frac{[0.1724]^1 \cdot [0.5]^2}{[0.1724]^1 \cdot [0.5]^2}$$

$$= \frac{0.0431}{0.0431} = 1. \text{ (Terpilih)}$$

Jalur kelima dari semut kelima adalah 5 – 4 – 6 – 3 – 2 – 1.

Jadi, jalur semut kelima adalah dengan 5 – 4 – 6 – 3 – 2 – 1 – 5 dengan panjang jalur adalah 47.0551.

\*Semut keenam

$$P_{(6,1)}^k = \frac{[0.08612]^1 \cdot [0.0485]^2}{[0.8612]^1 \cdot [0.0485]^2 + [0.08637]^1 \cdot [0.0535]^2 + [0.12905]^1 \cdot [0.0714]^2 + [0.08618]^1 \cdot [0.1961]^2 + [0.0646]^1 \cdot [0.1857]^2}$$

$$= \frac{0.000202}{0.00646} = 0.0312.$$

$$P_{(6,2)}^k = \frac{[0.08637]^1 \cdot [0.0535]^2}{[0.8612]^1 \cdot [0.0485]^2 + [0.08637]^1 \cdot [0.0535]^2 + [0.12905]^1 \cdot [0.0714]^2 + [0.08618]^1 \cdot [0.1961]^2 + [0.0646]^1 \cdot [0.1857]^2}$$

$$= \frac{0.000247}{0.00646} = 0.0382.$$

$$P_{(6,3)}^k = \frac{[0.12905]^1 \cdot [0.0714]^2}{[0.8612]^1 \cdot [0.0485]^2 + [0.08637]^1 \cdot [0.0535]^2 + [0.12905]^1 \cdot [0.0714]^2 + [0.08618]^1 \cdot [0.1961]^2 + [0.0646]^1 \cdot [0.1857]^2}$$

$$= \frac{0.000657}{0.00646} = 0.101.$$

$$P_{(6,4)}^k = \frac{[0.08618]^1 \cdot [0.1961]^2}{[0.8612]^1 \cdot [0.0485]^2 + [0.08637]^1 \cdot [0.0535]^2 + [0.12905]^1 \cdot [0.0714]^2 + [0.08618]^1 \cdot [0.1961]^2 + [0.0646]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00331}{0.00646} = 0.512. \text{ (Terpilih)}$$

$$P^k_{(6,5)} = \frac{[0.0646]^1 \cdot [0.1857]^2}{[0.8612]^1 \cdot [0.0485]^2 + [0.08637]^1 \cdot [0.0535]^2 + [0.12905]^1 \cdot [0.0714]^2 + [0.08618]^1 \cdot [0.1961]^2 + [0.0646]^1 \cdot [0.1857]^2}$$

$$= \frac{0.00223}{0.00646} = 0.345.$$

Jalur kesatu dari semut keenam adalah 6 – 4.

$$P^k_{(4,1)} = \frac{[0.0646]^1 \cdot [0.0644]^2}{[0.0646]^1 \cdot [0.0644]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.1104]^2 + [0.17267]^1 \cdot [0.3333]^2}$$

$$= \frac{0.000268}{0.0206} = 0.013.$$

$$P^k_{(4,2)} = \frac{[0.0646]^1 \cdot [0.0735]^2}{[0.0646]^1 \cdot [0.0644]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.1104]^2 + [0.17267]^1 \cdot [0.3333]^2}$$

$$= \frac{0.000349}{0.0206} = 0.017.$$

$$P^k_{(4,3)} = \frac{[0.0646]^1 \cdot [0.1104]^2}{[0.0646]^1 \cdot [0.0644]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.1104]^2 + [0.17267]^1 \cdot [0.3333]^2}$$

$$= \frac{0.00787}{0.0206} = 0.038.$$

$$P^k_{(4,5)} = \frac{[0.17267]^1 \cdot [0.3333]^2}{[0.0646]^1 \cdot [0.0644]^2 + [0.0646]^1 \cdot [0.0735]^2 + [0.0646]^1 \cdot [0.1104]^2 + [0.17267]^1 \cdot [0.3333]^2}$$

$$= \frac{0.0192}{0.0206} = 0.932. \text{ (Terpilih)}$$

Jalur kedua dari semut keenam adalah 6 – 4 – 5.

$$P^k_{(5,1)} = \frac{[0.0646]^1 \cdot [0.0604]^2}{[0.0646]^1 \cdot [0.0604]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.08618]^1 \cdot [0.1085]^2}$$

$$= \frac{0.000235}{0.001541} = 0.152.$$

$$P^k_{(5,2)} = \frac{[0.0646]^1 \cdot [0.0677]^2}{[0.0646]^1 \cdot [0.0604]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.08618]^1 \cdot [0.1085]^2}$$

$$= \frac{0.000296}{0.001541} = 0.192.$$

$$P^k_{(5,3)} = \frac{[0.08618]^1 \cdot [0.1085]^2}{[0.0646]^1 \cdot [0.0604]^2 + [0.0646]^1 \cdot [0.0677]^2 + [0.08618]^1 \cdot [0.1085]^2}$$

$$= \frac{0.00101}{0.001541} = 0.655. \text{ (Terpilih)}$$

Jalur ketiga dari semut keenam adalah 6 – 4 – 5 – 3.

$$P^k_{(3,1)} = \frac{[0.0646]^1 \cdot [0.128]^2}{[0.0646]^1 \cdot [0.128]^2 + [0.15063]^1 \cdot [0.1562]^2}$$

$$= \frac{0.00106}{0.00473} = 0.224.$$

$$P^k_{(3,2)} = \frac{[0.15063]^1 \cdot [0.1562]^2}{[0.0646]^1 \cdot [0.128]^2 + [0.15063]^1 \cdot [0.1562]^2}$$

$$= \frac{0.00367}{0.00473} = 0.775. \text{ (Terpilih)}$$

Jalur keempat dari semut keenam adalah 6 – 4 – 5 – 3 – 2.

$$P^k_{(2,1)} = \frac{[0.1724]^1 \cdot [0.5]^2}{[0.1724]^1 \cdot [0.5]^2}$$

$$= \frac{0.0431}{0.0431} = 1. \text{ (Terpilih)}$$

Jalur kelima dari semut keenam adalah 6 – 4 – 5 – 3 – 2 – 1.

Jadi, jalur semut keenam adalah dengan 6 – 4 – 5 – 3 – 2 – 1 – 6 dengan panjang jalur adalah 46.3371.

➤ Tabu setelah update feromon (iterasi 1)=

Semut pertama	1 – 2 – 3 – 5 – 6 – 4 – 1	dengan panjang jalur	43.6310.
Semut kedua	2 – 1 – 3 – 5 – 6 – 4 – 2	dengan panjang jalur	43.1154.
Semut ketiga	3 – 2 – 1 – 4 – 6 – 5 – 3	dengan panjang jalur	43.6310.
Semut keempat	4 – 6 – 5 – 3 – 2 – 1 – 4	dengan panjang jalur	43.6310.
Semut kelima	5 – 4 – 6 – 3 – 2 – 1 – 5	dengan panjang jalur	47.0551.
Semut keenam	6 – 4 – 5 – 3 – 2 – 1 – 6	dengan panjang jalur	46.3371.

Panjang jalur terpendek adalah 43.1154 dengan jalur 2 – 1 – 3 – 5 – 6 – 4 – 2.

Iterasi terus dilakukan sampai iterasi maksimum. Panjang jalur dari setiap iterasi dibandingkan dengan panjang jalur terpendek pada iterasi sebelumnya, jika panjang jalurnya lebih kecil dari iterasi sebelumnya maka panjang jalur itu akan disimpan.

## ➤ Dengan menggunakan metode pohon

1	1 – 2 – 3 – 4 – 5 – 6 – 1	46.4592
2	1 – 2 – 3 – 4 – 6 – 5 – 1	44.4956
3	1 – 2 – 3 – 5 – 4 – 6 – 1	46.3372
4	1 – 2 – 3 – 5 – 6 – 4 – 1	43.6310
5	1 – 2 – 3 – 6 – 4 – 5 – 1	47.0551
6	1 – 2 – 3 – 6 – 5 – 4 – 1	46.3125
7	1 – 2 – 4 – 3 – 5 – 6 – 1	59.8771
8	1 – 2 – 4 – 3 – 6 – 5 – 1	60.5950
9	1 – 2 – 4 – 5 – 3 – 6 – 1	62.4365
10	1 – 2 – 4 – 5 – 6 – 3 – 1	45.7969
11	1 – 2 – 4 – 6 – 3 – 5 – 1	60.4730
12	1 – 2 – 4 – 6 – 5 – 3 – 1	43.1154
13	1 – 2 – 5 – 3 – 4 – 6 – 1	60.7543
14	1 – 2 – 5 – 3 – 6 – 4 – 1	60.6076
15	1 – 2 – 5 – 4 – 3 – 6 – 1	63.4357
16	1 – 2 – 5 – 4 – 6 – 3 – 1	46.6741
17	1 – 2 – 5 – 6 – 3 – 4 – 1	60.7295
18	1 – 2 – 5 – 6 – 4 – 3 – 1	44.1146
19	1 – 2 – 6 – 3 – 4 – 5 – 1	63.2899
20	1 – 2 – 6 – 3 – 5 – 4 – 1	62.4253
21	1 – 2 – 6 – 4 – 3 – 5 – 1	60.6084
22	1 – 2 – 6 – 4 – 5 – 3 – 1	45.8104
23	1 – 2 – 6 – 5 – 3 – 4 – 1	59.8658
24	1 – 2 – 6 – 5 – 4 – 3 – 1	45.9323
25	1 – 3 – 2 – 4 – 5 – 6 – 1	56.8155
26	1 – 3 – 2 – 4 – 6 – 5 – 1	54.8520
27	1 – 3 – 2 – 5 – 4 – 6 – 1	57.6927

28	1-3-2-5-6-4-1	54.9866
29	1-3-2-6-4-5-1	57.5469
30	1-3-2-6-5-4-1	56.8043
31	1-3-4-2-5-6-1	71.2326
32	1-3-4-2-6-5-1	71.0866
33	1-3-4-5-2-6-1	73.9275
34	1-3-4-5-6-2-1	45.9323
35	1-3-4-6-2-5-1	71.9640
36	1-3-4-6-5-2-1	44.1146
37	1-3-5-2-4-6-1	71.1106
38	1-3-5-2-6-4-1	71.0994
39	1-3-5-4-2-6-1	72.9283
40	1-3-5-4-6-2-1	45.8104
41	1-3-5-6-2-4-1	70.2221
42	1-3-5-6-4-2-1	43.1154
43	1-3-6-2-4-5-1	73.6462
44	1-3-6-2-5-4-1	73.7808
45	1-3-6-4-2-5-1	71.8285
46	1-3-6-4-5-2-1	46.6741
47	1-3-6-5-2-4-1	71.0859
48	1-3-6-5-4-2-1	45.7969
49	1-4-2-3-5-6-1	70.7490
50	1-4-2-3-6-5-1	71.4669
51	1-4-2-5-3-6-1	87.7255
52	1-4-2-5-6-3-1	71.0859
53	1-4-2-6-3-5-1	87.5797
54	1-4-2-6-5-3-1	70.2221
55	1-4-3-2-5-6-1	71.7482
56	1-4-3-2-6-5-1	71.6023
57	1-4-3-5-2-6-1	87.8610
58	1-4-3-5-6-2-1	59.8658
59	1-4-3-6-2-5-1	88.5789
60	1-4-3-6-5-2-1	60.7295
61	1-4-5-2-3-6-1	74.3077
62	1-4-5-2-6-3-1	73.7808
63	1-4-5-3-2-6-1	73.4439
64	1-4-5-3-6-2-1	62.4253
65	1-4-5-6-2-3-1	56.8043
66	1-4-5-6-3-2-1	46.3125
67	1-4-6-2-3-5-1	71.4803
68	1-4-6-2-5-3-1	71.0994
69	1-4-6-3-2-5-1	72.3441
70	1-4-6-3-5-2-1	60.6076
71	1-4-6-5-2-3-1	54.9866
72	1-4-6-5-3-2-1	43.6310
73	1-5-2-3-4-6-1	72.4908

74	1-5-2-3-6-4-1	72.3441
75	1-5-2-4-3-6-1	88.5902
76	1-5-2-4-6-3-1	71.8285
77	1-5-2-6-3-4-1	88.5789
78	1-5-2-6-4-3-1	71.9640
79	1-5-3-2-4-6-1	71.4916
80	1-5-3-2-6-4-1	71.4803
81	1-5-3-4-2-6-1	87.7264
82	1-5-3-4-6-2-1	60.6084
83	1-5-3-6-2-4-1	87.5797
84	1-5-3-6-4-2-1	60.4730
85	1-5-4-2-3-6-1	74.1731
86	1-5-4-2-6-3-1	73.6462
87	1-5-4-3-2-6-1	74.3085
88	1-5-4-3-6-2-1	63.2899
89	1-5-4-6-2-3-1	57.5469
90	1-5-4-6-3-2-1	47.0551
91	1-5-6-2-3-4-1	71.6023
92	1-5-6-2-4-3-1	71.0868
93	1-5-6-3-2-4-1	71.4669
94	1-5-6-3-4-2-1	60.5950
95	1-5-6-4-2-3-1	54.8520
96	1-5-6-4-3-2-1	44.4956
97	1-6-2-3-4-5-1	74.3085
98	1-6-2-3-5-4-1	73.4439
99	1-6-2-4-3-5-1	87.7264
100	1-6-2-4-5-3-1	72.9283
101	1-6-2-5-3-4-1	87.8610
102	1-6-2-5-4-3-1	73.9275
103	1-6-3-2-4-5-1	74.1731
104	1-6-3-2-5-4-1	74.3077
105	1-6-3-4-2-5-1	88.5902
106	1-6-3-4-5-2-1	63.4357
107	1-6-3-5-2-4-1	87.8255
108	1-6-3-5-4-2-1	62.4365
109	1-6-4-2-3-5-1	71.4916
110	1-6-4-2-5-3-1	71.1106
111	1-6-4-3-2-5-1	72.4908
112	1-6-4-3-5-2-1	60.7543
113	1-6-4-5-2-3-1	57.6927
114	1-6-4-5-3-2-1	46.3372
115	1-6-5-2-3-4-1	71.7482
116	1-6-5-2-4-3-1	71.2326
117	1-6-5-3-2-4-1	70.7490
118	1-6-5-3-4-2-1	59.8771
119	1-6-5-4-2-3-1	56.8155

120	1-6-5-4-3-2-1	46.4592
121	2-1-3-4-5-6-2	45.9323
122	2-1-3-4-6-5-2	44.1146
123	2-1-3-5-4-6-2	45.8104
124	2-1-3-5-6-4-2	43.1154
125	2-1-3-6-4-5-2	46.6741
126	2-1-3-6-5-4-2	45.7969
127	2-1-4-3-5-6-2	59.8658
128	2-1-4-3-6-5-2	60.7295
129	2-1-4-5-3-6-2	62.4253
130	2-1-4-5-6-3-2	46.3125
131	2-1-4-6-3-5-2	60.6076
132	2-1-4-6-5-3-2	43.6310
133	2-1-5-3-4-6-2	60.6084
134	2-1-5-3-6-4-2	60.4730
135	2-1-5-4-3-6-2	63.2899
136	2-1-5-4-6-3-2	47.0551
137	2-1-5-6-3-4-2	60.5950
138	2-1-5-6-4-3-2	44.4956
139	2-1-6-3-4-5-2	63.4357
140	2-1-6-3-5-4-2	62.4365
141	2-1-6-4-3-5-2	60.7543
142	2-1-6-4-5-3-2	46.4592
143	2-1-6-5-3-4-2	59.8771
144	2-1-6-5-4-3-2	46.4592
145	2-3-1-4-5-6-2	56.8043
146	2-3-1-4-6-5-2	54.9866
147	2-3-1-5-4-6-2	57.5469
148	2-3-1-5-6-4-2	54.8520
149	2-3-1-6-4-5-2	57.6927
150	2-3-1-6-5-4-2	56.8155
151	2-3-4-1-5-6-2	71.6023
152	2-3-4-1-6-5-2	71.7482
153	2-3-4-5-1-6-2	74.3085
154	2-3-4-5-6-1-2	46.4592
155	2-3-4-6-1-5-2	72.4908
156	2-3-4-6-5-1-2	44.4956
157	2-3-5-1-4-6-2	71.4803
158	2-3-5-1-6-4-2	71.4916
159	2-3-5-4-1-6-2	73.4439
160	2-3-5-4-6-1-2	46.3372
161	2-3-5-6-1-4-2	70.7490
162	2-3-5-6-4-1-2	43.6310
163	2-3-6-1-4-5-2	74.3077
164	2-3-6-1-5-4-2	74.1731
165	2-3-6-4-1-5-2	72.3441



166	2-3-6-4-5-1-2	47.0551
167	2-3-6-5-1-4-2	71.4669
168	2-3-6-5-4-1-2	46.3125
169	2-4-1-3-5-6-2	70.2221
170	2-4-1-3-6-5-2	71.0859
171	2-4-1-5-3-6-2	87.5797
172	2-4-1-5-6-3-2	71.4669
173	2-4-1-6-3-5-2	87.7255
174	2-4-1-6-5-3-2	70.7490
175	2-4-3-1-5-6-2	71.0868
176	2-4-3-1-6-5-2	71.2326
177	2-4-3-5-1-6-2	87.7264
178	2-4-3-5-6-1-2	59.8771
179	2-4-3-6-1-5-2	88.5902
180	2-4-3-6-5-1-2	60.5950
181	2-4-5-1-3-6-2	73.6462
182	2-4-5-1-6-3-2	74.1731
183	2-4-5-3-1-6-2	72.9283
184	2-4-5-3-6-1-2	62.4365
185	2-4-5-6-1-3-2	56.8155
186	2-4-5-6-3-1-2	45.7969
187	2-4-6-1-3-5-2	71.1106
188	2-4-6-1-5-3-2	71.4916
189	2-4-6-3-1-5-2	71.8285
190	2-4-6-3-5-1-2	60.4730
191	2-4-6-5-1-3-2	54.8520
192	2-4-6-5-3-1-2	43.1154
193	2-5-1-3-4-6-2	71.9640
194	2-5-1-3-6-4-2	71.8285
195	2-5-1-4-3-6-2	88.5789
196	2-5-1-4-6-3-2	72.3441
197	2-5-1-6-3-4-2	88.5902
198	2-5-1-6-4-3-2	72.4908
199	2-5-3-1-4-6-2	71.0994
200	2-5-3-1-6-4-2	71.1106
201	2-5-3-4-1-6-2	87.8610
202	2-5-3-4-6-1-2	60.7543
203	2-5-3-6-1-4-2	87.7255
204	2-5-3-6-4-1-2	60.6076
205	2-5-4-1-3-6-2	73.7808
206	2-5-4-1-6-3-2	74.3077
207	2-5-4-3-1-6-2	73.9275
208	2-5-4-3-6-1-2	63.4357
209	2-5-4-6-1-3-2	57.6927
210	2-5-4-6-3-1-2	46.6741
211	2-5-6-1-3-4-2	71.2326

212	2-5-6-1-4-3-2	71.7482
213	2-5-6-3-1-4-2	71.0859
214	2-5-6-3-4-1-2	60.7295
215	2-5-6-4-1-3-2	54.9866
216	2-5-6-4-3-1-2	44.1146
217	2-6-1-3-4-5-2	73.9275
218	2-6-1-3-5-4-2	72.9283
219	2-6-1-4-3-5-2	87.8610
220	2-6-1-4-5-3-2	73.4439
221	2-6-1-5-3-4-2	87.7264
222	2-6-1-5-4-3-2	74.3085
223	2-6-3-1-4-5-2	73.7808
224	2-6-3-1-5-4-2	73.6462
225	2-6-3-4-1-5-2	88.5789
226	2-6-3-4-5-1-2	63.2899
227	2-6-3-5-1-4-2	87.5797
228	2-6-3-5-4-1-2	62.4253
229	2-6-4-1-3-5-2	71.0994
230	2-6-4-1-5-3-2	71.4803
231	2-6-4-3-1-5-2	71.9640
232	2-6-4-3-5-1-2	60.6084
233	2-6-4-5-1-3-2	57.5469
234	2-6-4-5-3-1-2	45.8104
235	2-6-5-1-3-4-2	71.0868
236	2-6-5-1-4-3-2	71.6023
237	2-6-5-3-1-4-2	70.2221
238	2-6-5-3-4-1-2	59.8658
239	2-6-5-4-1-3-2	56.8043
240	2-6-5-4-3-1-2	45.9323
241	3-1-2-4-5-6-3	45.7969
242	3-1-2-4-6-5-3	43.1154
243	3-1-2-5-4-6-3	46.6741
244	3-1-2-5-6-4-3	44.1146
245	3-1-2-6-4-5-3	45.8104
246	3-1-2-6-5-4-3	45.9323
247	3-1-4-2-5-6-3	71.0859
248	3-1-4-2-6-5-3	70.2221
249	3-1-4-5-2-6-3	73.7808
250	3-1-4-5-6-2-3	56.8043
251	3-1-4-6-2-5-3	71.0994
252	3-1-4-6-5-2-3	54.9866
253	3-1-5-2-4-6-3	71.8285
254	3-1-5-2-6-4-3	71.9640
255	3-1-5-4-2-6-3	73.6462
256	3-1-5-4-6-2-3	57.55469
257	3-1-5-6-2-4-3	71.0868

258	3-1-5-6-4-2-3	54.8520
259	3-1-6-2-4-5-3	72.9283
260	3-1-6-2-5-4-3	73.9275
261	3-1-6-4-2-5-3	71.1106
262	3-1-6-4-5-2-3	57.6927
263	3-1-6-5-2-4-3	71.2326
264	3-1-6-5-4-2-3	56.8155
265	3-2-1-4-5-6-3	46.3125
266	3-2-1-4-6-5-3	43.6310
267	3-2-1-5-4-6-3	47.0551
268	3-2-1-5-6-4-3	44.4956
269	3-2-1-6-4-5-3	46.3372
270	3-2-1-6-5-4-3	46.4592
271	3-2-4-1-5-6-3	71.4669
272	3-2-4-1-6-5-3	70.7490
273	3-2-4-5-1-6-3	74.1731
274	3-2-4-5-6-1-3	56.8155
275	3-2-4-6-1-5-3	71.4916
276	3-2-4-6-5-1-3	54.8520
277	3-2-5-1-4-6-3	72.3441
278	3-2-5-1-6-4-3	72.4908
279	3-2-5-4-1-6-3	74.3077
280	3-2-5-4-6-1-3	57.6927
281	3-2-5-6-1-4-3	71.7482
282	3-2-5-6-4-1-3	54.9866
283	3-2-6-1-4-5-3	73.4439
284	3-2-6-1-5-4-3	74.3085
285	3-2-6-4-1-5-3	71.4803
286	3-2-6-4-5-1-3	57.5469
287	3-2-6-5-1-4-3	71.6023
288	3-2-6-5-4-1-3	56.8043
289	3-4-1-2-5-6-3	60.7295
290	3-4-1-2-6-5-3	59.8658
291	3-4-1-5-2-6-3	88.5789
292	3-4-1-5-6-2-3	71.6023
293	3-4-1-6-2-5-3	87.8610
294	3-4-1-6-5-2-3	71.7482
295	3-4-2-1-5-6-3	60.5950
296	3-4-2-1-6-5-3	59.8771
297	3-4-2-5-1-6-3	88.5902
298	3-4-2-5-6-1-3	71.2326
299	3-4-2-6-1-5-3	87.7264
300	3-4-2-6-5-1-3	71.0868
301	3-4-5-1-2-6-3	63.2899
302	3-4-5-1-6-2-3	74.3085
303	3-4-5-2-1-6-3	63.4357

304	3-4-5-2-6-1-3	73.9275
305	3-4-5-6-1-2-3	46.4592
306	3-4-5-6-2-1-3	45.9323
307	3-4-6-1-2-5-3	60.7543
308	3-4-6-1-5-2-3	72.4908
309	3-4-6-2-1-5-3	60.6084
310	3-4-6-2-5-1-3	71.9640
311	3-4-6-5-1-2-3	44.4956
312	3-4-6-5-2-1-3	44.1146
313	3-5-1-2-4-6-3	60.4730
314	3-5-1-2-6-4-3	60.6084
315	3-5-1-4-2-6-3	87.5797
316	3-5-1-4-6-2-3	71.4803
317	3-5-1-6-2-4-3	87.7264
318	3-5-1-6-4-2-3	71.4916
319	3-5-2-1-4-6-3	60.6076
320	3-5-2-1-6-4-3	60.7543
321	3-5-2-4-1-6-3	87.7255
322	3-5-2-4-6-1-3	71.1106
323	3-5-2-6-1-4-3	87.8610
324	3-5-2-6-4-1-3	71.0994
325	3-5-4-1-2-6-3	62.4253
326	3-5-4-1-6-2-3	73.4439
327	3-5-4-2-1-6-3	62.4365
328	3-5-4-2-6-1-3	72.9283
329	3-5-4-6-1-2-3	46.3372
330	3-5-4-6-2-1-3	45.8104
331	3-5-6-1-2-4-3	59.8771
332	3-5-6-1-4-2-3	70.7490
333	3-5-6-2-1-4-3	59.8658
334	3-5-6-2-4-1-3	70.2221
335	3-5-6-4-1-2-3	43.6310
336	3-5-6-4-2-1-3	43.1154
337	3-6-1-2-4-5-3	62.4365
338	3-6-1-2-5-4-3	63.4357
339	3-6-1-4-2-5-3	87.7255
340	3-6-1-4-5-2-3	74.3077
341	3-6-1-5-2-4-3	88.5902
342	3-6-1-5-4-2-3	74.1731
343	3-6-2-1-4-5-3	62.4253
344	3-6-2-1-5-4-3	63.2899
345	3-6-2-4-1-5-3	87.5797
346	3-6-2-4-5-1-3	73.6462
347	3-6-2-5-1-4-3	88.5789
348	3-6-2-5-4-1-3	73.7808
349	3-6-4-1-2-5-3	60.6076

350	3-6-4-1-5-2-3	72.3441
351	3-6-4-2-1-5-3	60.4730
352	3-6-4-2-5-1-3	71.8285
353	3-6-4-5-1-2-3	47.0551
354	3-6-4-5-2-1-3	46.6741
355	3-6-5-1-2-4-3	60.5950
356	3-6-5-1-4-2-3	71.4669
357	3-6-5-2-1-4-3	60.7295
358	3-6-5-2-4-1-3	71.0859
359	3-6-5-4-1-2-3	46.3125
360	3-6-5-4-2-1-3	45.7969
361	4-1-2-3-5-6-4	43.6310
362	4-1-2-3-6-5-4	46.3125
363	4-1-2-5-3-6-4	60.6076
364	4-1-2-5-6-3-4	60.7295
365	4-1-2-6-3-5-4	62.4253
366	4-1-2-6-5-3-4	59.8658
367	4-1-3-2-5-6-4	54.9866
368	4-1-3-2-6-5-4	56.8043
369	4-1-3-5-2-6-4	71.0994
370	4-1-3-5-6-2-4	70.2221
371	4-1-3-6-2-5-4	73.7808
372	4-1-3-6-5-2-4	71.0859
373	4-1-5-2-3-6-4	72.3441
374	4-1-5-2-6-3-4	88.5789
375	4-1-5-3-2-6-4	71.4803
376	4-1-5-3-6-2-4	87.5797
377	4-1-5-6-2-3-4	71.6023
378	4-1-5-6-3-2-4	71.4669
379	4-1-6-2-3-5-4	73.4439
380	4-1-6-2-5-3-4	87.8610
381	4-1-6-3-2-5-4	74.3077
382	4-1-6-3-5-2-4	87.7255
383	4-1-6-5-2-3-4	71.7482
384	4-1-6-5-3-2-4	70.7490
385	4-2-1-3-5-6-4	43.1154
386	4-2-1-3-6-5-4	45.7969
387	4-2-1-5-3-6-4	60.4730
388	4-2-1-5-6-3-4	60.5950
389	4-2-1-6-3-5-4	62.4365
390	4-2-1-6-5-3-4	59.8771
391	4-2-3-1-5-6-4	54.8520
392	4-2-3-1-6-5-4	56.8155
393	4-2-3-5-1-6-4	71.4916
394	4-2-3-5-6-1-4	70.7490
395	4-2-3-6-1-5-4	74.1731

396	4-2-3-6-5-1-4	71.4669
397	4-2-5-1-3-6-4	71.8285
398	4-2-5-1-6-3-4	88.5902
399	4-2-5-3-1-6-4	71.1106
400	4-2-5-3-6-1-4	87.7255
401	4-2-5-6-1-3-4	71.2326
402	4-2-5-6-3-1-4	71.0859
403	4-2-6-1-3-5-4	72.9283
404	4-2-6-1-5-3-4	87.7264
405	4-2-6-3-1-5-4	73.6462
406	4-2-6-3-5-1-4	87.5797
407	4-2-6-5-1-3-4	71.0868
408	4-2-6-5-3-1-4	70.2221
409	4-3-1-2-5-6-4	44.1146
410	4-3-1-2-6-5-4	45.9323
411	4-3-1-5-2-6-4	71.9640
412	4-3-1-5-6-2-4	71.0868
413	4-3-1-6-2-5-4	73.9275
414	4-3-1-6-5-2-4	71.2326
415	4-3-2-1-5-6-4	44.4956
416	4-3-2-1-6-5-4	46.4592
417	4-3-2-5-1-6-4	72.4908
418	4-3-2-5-6-1-4	71.7482
419	4-3-2-6-1-5-4	74.3085
420	4-3-2-6-5-1-4	71.6023
421	4-3-5-1-2-6-4	60.6084
422	4-3-5-1-6-2-4	87.8264
423	4-3-5-2-1-6-4	60.7543
424	4-3-5-2-6-1-4	87.8610
425	4-3-5-6-1-2-4	59.8771
426	4-3-5-6-2-1-4	59.8658
427	4-3-6-1-2-5-4	63.4357
428	4-3-6-1-5-2-4	88.5902
429	4-3-6-2-1-5-4	63.2899
430	4-3-6-2-5-1-4	88.5789
431	4-3-6-5-1-2-4	60.5950
432	4-3-6-5-2-1-4	60.7295
433	4-5-1-2-3-6-4	47.0551
434	4-5-1-2-6-3-4	63.2899
435	4-5-1-3-2-6-4	57.5469
436	4-5-1-3-6-2-4	73.6462
437	4-5-1-6-2-3-4	74.3085
438	4-5-1-6-3-2-4	74.1731
439	4-5-2-1-3-6-4	46.6741
440	4-5-2-1-6-3-4	63.4357
441	4-5-2-3-1-6-4	57.6927

442	4-5-2-3-6-1-4	74.3077
443	4-5-2-6-1-3-4	73.9275
444	4-5-2-6-3-1-4	73.7808
445	4-5-3-1-2-6-4	45.8104
446	4-5-3-1-6-2-4	72.9283
447	4-5-3-2-1-6-4	46.3372
448	4-5-3-2-6-1-4	73.4439
449	4-5-3-6-1-2-4	62.4365
450	4-5-3-6-2-1-4	62.4253
451	4-5-6-1-2-3-4	46.4592
452	4-5-6-1-3-2-4	56.8155
453	4-5-6-2-1-3-4	45.9323
454	4-5-6-2-3-1-4	56.8043
455	4-5-6-3-1-2-4	45.7969
456	4-5-6-3-2-1-4	46.3125
457	4-6-1-2-3-5-4	46.3372
458	4-6-1-2-5-3-4	60.7543
459	4-6-1-3-2-5-4	57.6927
460	4-6-1-3-5-2-4	71.1106
461	4-6-1-5-2-3-4	72.4908
462	4-6-1-5-3-2-4	71.4916
463	4-6-2-1-3-5-4	45.8104
464	4-6-2-1-5-3-4	60.6084
465	4-6-2-3-1-5-4	57.5469
466	4-6-2-3-5-1-4	71.4803
467	4-6-2-5-1-3-4	71.9640
468	4-6-2-5-3-1-4	71.0994
469	4-6-3-1-2-5-4	46.6741
470	4-6-3-1-5-2-4	1.8285
471	4-6-3-2-1-5-4	47.0551
472	4-6-3-2-5-1-4	72.3441
473	4-6-3-5-1-2-4	60.4730
474	4-6-3-5-2-1-4	60.6076
475	4-6-5-1-2-3-4	44.4956
476	4-6-5-1-3-2-4	54.8520
477	4-6-5-2-1-3-4	44.1146
478	4-6-5-2-3-1-4	54.9866
479	4-6-5-3-1-2-4	43.1154
480	4-6-5-3-2-1-4	43.6310
481	5-1-2-3-4-6-5	44.4956
482	5-1-2-3-6-4-5	47.0551
483	5-1-2-4-3-6-5	60.5950
484	5-1-2-4-6-3-5	60.4730
485	5-1-2-6-3-4-5	63.2899
486	5-1-2-6-4-3-5	60.6084
487	5-1-3-2-4-6-5	54.8520

488	5-1-3-2-6-4-5	57.5469
489	5-1-3-4-2-6-5	71.0868
490	5-1-3-4-6-2-5	71.9640
491	5-1-3-6-2-4-5	73.6462
492	5-1-3-6-4-2-5	71.8285
493	5-1-4-2-3-6-5	71.4669
494	5-1-4-2-6-3-5	87.5797
495	5-1-4-3-2-6-5	71.6023
496	5-1-4-3-6-2-5	88.5789
497	5-1-4-6-2-3-5	71.4803
498	5-1-4-6-3-2-5	72.3441
499	5-1-6-2-3-4-5	74.3085
500	5-1-6-2-4-3-5	87.7264
501	5-1-6-3-2-4-5	74.1731
502	5-1-6-3-4-2-5	88.5902
503	5-1-6-4-2-3-5	71.4916
504	5-1-6-4-3-2-5	72.4908
505	5-2-1-3-4-6-5	44.1146
506	5-2-1-3-6-4-5	46.6741
507	5-2-1-4-3-6-5	60.7295
508	5-2-1-4-6-3-5	60.6076
509	5-2-1-6-3-4-5	63.4357
510	5-2-1-6-4-3-5	60.7543
511	5-2-3-1-4-6-5	54.9866
512	5-2-3-1-6-4-5	57.6927
513	5-2-3-4-1-6-5	71.7482
514	5-2-3-4-6-1-5	72.4908
515	5-2-3-6-1-4-5	74.3077
516	5-2-3-6-4-1-5	72.3441
517	5-2-4-1-3-6-5	71.0859
518	5-2-4-1-6-3-5	87.8255
519	5-2-4-3-1-6-5	71.2326
520	5-2-4-3-6-1-5	88.5902
521	5-2-4-6-1-3-5	71.1106
522	5-2-4-6-3-1-5	71.8285
523	5-2-6-1-3-4-5	73.9275
524	5-2-6-1-4-3-5	87.8610
525	5-2-6-3-1-4-5	73.7808
526	5-2-6-3-4-1-5	88.5789
527	5-2-6-4-1-3-5	71.0994
528	5-2-6-4-3-1-5	71.9640
529	5-3-1-2-4-6-5	43.1154
530	5-3-1-2-6-4-5	45.8104
531	5-3-1-4-2-6-5	70.2221
532	5-3-1-4-6-2-5	71.0994
533	5-3-1-6-2-4-5	72.9283



534	5-3-1-6-4-2-5	71.1106
535	5-3-2-1-4-6-5	43.6310
536	5-3-2-1-6-4-5	46.3372
537	5-3-2-4-1-6-5	70.7490
538	5-3-2-4-6-1-5	71.4916
539	5-3-2-6-1-4-5	73.4439
540	5-3-2-6-4-1-5	71.4803
541	5-3-4-1-2-6-5	59.8658
542	5-3-4-1-6-2-5	87.8610
543	5-3-4-2-1-6-5	59.8771
544	5-3-4-2-6-1-5	87.7264
545	5-3-4-6-1-2-5	60.7543
546	5-3-4-6-2-1-5	60.6084
547	5-3-6-1-2-4-5	62.4365
548	5-3-6-1-4-2-5	87.7255
549	5-3-6-2-1-4-5	62.4253
550	5-3-6-2-4-1-5	87.5797
551	5-3-6-4-1-2-5	60.6076
552	5-3-6-4-2-1-5	60.4730
553	5-4-1-2-3-6-5	46.3125
554	5-4-1-2-6-3-5	62.4253
555	5-4-1-3-2-6-5	56.8043
556	5-4-1-3-6-2-5	73.7808
557	5-4-1-6-2-3-5	73.4439
558	5-4-1-6-3-2-5	74.3077
559	5-4-2-1-3-6-5	45.7969
560	5-4-2-1-6-3-5	62.4365
561	5-4-2-3-1-6-5	56.8155
562	5-4-2-3-6-1-5	74.1731
563	5-4-2-6-1-3-5	72.9283
564	5-4-2-6-3-1-5	73.6462
565	5-4-3-1-2-6-5	45.9323
566	5-4-3-1-6-2-5	73.9275
567	5-4-3-2-1-6-5	46.4592
568	5-4-3-2-6-1-5	74.3085
569	5-4-3-6-1-2-5	63.4357
570	5-4-3-6-2-1-5	63.2889
571	5-4-6-1-2-3-5	46.3372
572	5-4-6-1-3-2-5	57.6927
573	5-4-6-2-1-3-5	45.8104
574	5-4-6-2-3-1-5	57.5469
575	5-4-6-3-1-2-5	46.6741
576	5-4-6-3-2-1-5	47.0551
577	5-6-1-2-3-4-5	46.4592
578	5-6-1-2-4-3-5	59.8771
579	5-6-1-3-2-4-5	56.8155

580	5-6-1-3-4-2-5	71.2326
581	5-6-1-4-2-3-5	70.7490
582	5-6-1-4-3-2-5	71.7482
583	5-6-2-1-3-4-5	45.9323
584	5-6-2-1-4-3-5	59.8658
585	5-6-2-3-1-4-5	56.8043
586	5-6-2-3-4-1-5	71.6023
587	5-6-2-4-1-3-5	70.2221
588	5-6-2-4-3-1-5	71.0868
589	5-6-3-1-2-4-5	45.7969
590	5-6-3-1-4-2-5	71.0859
591	5-6-3-2-1-4-5	46.3125
592	5-6-3-2-4-1-5	71.4669
593	5-6-3-4-1-2-5	60.7295
594	5-6-3-4-2-1-5	60.5950
595	5-6-4-1-2-3-5	43.6310
596	5-6-4-1-3-2-5	54.9866
597	5-6-4-2-1-3-5	43.1154
598	5-6-4-2-3-1-5	54.8520
599	5-6-4-3-1-2-5	44.1146
600	5-6-4-3-2-1-5	44.4956
601	6-1-2-3-4-5-6	46.4592
602	6-1-2-3-5-4-6	46.3372
603	6-1-2-4-3-5-6	59.8771
604	6-1-2-4-5-3-6	62.4365
605	6-1-2-5-3-4-6	60.7543
606	6-1-2-5-4-3-6	63.4357
607	6-1-3-2-4-5-6	56.8155
608	6-1-3-2-5-4-6	57.6927
609	6-1-3-4-2-5-6	71.2326
610	6-1-3-4-5-2-6	73.9275
611	6-1-3-5-2-4-6	71.1106
612	6-1-3-5-4-2-6	72.9283
613	6-1-4-2-3-5-6	70.7490
614	6-1-4-2-5-3-6	87.7255
615	6-1-4-3-2-5-6	71.7482
616	6-1-4-3-5-2-6	87.8610
617	6-1-4-5-2-3-6	74.3077
618	6-1-4-5-3-2-6	73.4439
619	6-1-5-2-3-4-6	72.4908
620	6-1-5-2-4-3-6	88.5902
621	6-1-5-3-2-4-6	71.4916
622	6-1-5-3-4-2-6	87.7264
623	6-1-5-4-2-3-6	74.1731
624	6-1-5-4-3-2-6	74.3085
625	6-2-1-3-4-5-6	45.9323

626	6-2-1-3-5-4-6	45.8104
627	6-2-1-4-3-5-6	59.8658
628	6-2-1-4-5-3-6	62.4253
629	6-2-1-5-3-4-6	60.6084
630	6-2-1-5-4-3-6	63.2899
631	6-2-3-1-4-5-6	56.8043
632	6-2-3-1-5-4-6	57.5469
633	6-2-3-4-1-5-6	71.6023
634	6-2-3-4-5-1-6	74.3085
635	6-2-3-5-1-4-6	71.4803
636	6-2-3-5-4-1-6	73.4439
637	6-2-4-1-3-5-6	70.2221
638	6-2-4-1-5-3-6	87.5797
639	6-2-4-3-1-5-6	71.0868
640	6-2-4-3-5-1-6	87.7264
641	6-2-4-5-1-3-6	73.6462
642	6-2-4-5-3-1-6	72.9283
643	6-2-5-1-3-4-6	71.9640
644	6-2-5-1-4-3-6	88.5789
645	6-2-5-3-1-4-6	71.0994
646	6-2-5-3-4-1-6	87.8610
647	6-2-5-4-1-3-6	73.7808
648	6-2-5-4-3-1-6	73.9275
649	6-3-1-2-4-5-6	45.7969
650	6-3-1-2-5-4-6	46.6741
651	6-3-1-4-2-5-6	71.0859
652	6-3-1-4-5-2-6	73.7808
653	6-3-1-5-2-4-6	71.8285
654	6-3-1-5-4-2-6	73.6462
655	6-3-2-1-4-5-6	46.3125
656	6-3-2-1-5-4-6	47.0551
657	6-3-2-4-1-5-6	71.4669
658	6-3-2-4-5-1-6	74.1731
659	6-3-2-5-1-4-6	72.3441
660	6-3-2-5-4-1-6	74.3077
661	6-3-4-1-2-5-6	60.7295
662	6-3-4-1-5-2-6	88.5789
663	6-3-4-2-1-5-6	60.5950
664	6-3-4-2-5-1-6	88.5902
665	6-3-4-5-1-2-6	63.2899
666	6-3-4-5-2-1-6	63.4357
667	6-3-5-1-2-4-6	60.4730
668	6-3-5-1-4-2-6	87.5797
669	6-3-5-2-1-4-6	60.6076
670	6-3-5-2-4-1-6	87.7255
671	6-3-5-4-1-2-6	62.4253

672	6-3-5-4-2-1-6	62.4365
673	6-4-1-2-3-5-6	43.6310
674	6-4-1-2-5-3-6	60.6076
675	6-4-1-3-2-5-6	54.9866
676	6-4-1-3-5-2-6	71.0994
677	6-4-1-5-2-3-6	72.3441
678	6-4-1-5-3-2-6	71.4803
679	6-4-2-1-3-5-6	43.1154
680	6-4-2-1-5-3-6	60.4730
681	6-4-2-3-1-5-6	54.8520
682	6-4-2-3-5-1-6	71.4916
683	6-4-2-5-1-3-6	71.8285
684	6-4-2-5-3-1-6	71.1106
685	6-4-3-1-2-5-6	44.1146
686	6-4-3-1-5-2-6	71.9640
687	6-4-3-2-1-5-6	44.4956
688	6-4-3-2-5-1-6	72.4908
689	6-4-3-5-1-2-6	60.6084
690	6-4-3-5-2-1-6	60.7543
691	6-4-5-1-2-3-6	47.0551
692	6-4-5-1-3-2-6	57.5469
693	6-4-5-2-1-3-6	46.6741
694	6-4-5-2-3-1-6	57.6927
695	6-4-5-3-1-2-6	45.8104
696	6-4-5-3-2-1-6	46.3372
697	6-5-1-2-3-4-6	44.4956
698	6-5-1-2-4-3-6	60.5950
699	6-5-1-3-2-4-6	54.8520
700	6-5-1-3-4-2-6	71.0868
701	6-5-1-4-2-3-6	71.4669
702	6-5-1-4-3-2-6	71.6023
703	6-5-2-1-3-4-6	44.1146
704	6-5-2-1-4-3-6	60.7295
705	6-5-2-3-1-4-6	54.9866
706	6-5-2-3-4-1-6	71.7482
707	6-5-2-4-1-3-6	71.0859
708	6-5-2-4-3-1-6	71.2326
709	6-5-3-1-2-4-6	43.1154
710	6-5-3-1-4-2-6	70.2221
711	6-5-3-2-1-4-6	43.6310
712	6-5-3-2-4-1-6	70.7490
713	6-5-3-4-1-2-6	59.8658
714	6-5-3-4-2-1-6	59.8771
715	6-5-4-1-2-3-6	46.3125
716	6-5-4-1-3-2-6	56.8043
717	6-5-4-2-1-3-6	45.7969

718	6-5-4-2-3-1-6	56.8155
719	6-5-4-3-1-2-6	45.9323
720	6-5-4-3-2-1-6	46.4592