## Solution1

nL=norm([xLB-Ax,yLB-Ay])+R\*norm([xUB-xLB,yUB-yLB])+ ...

norm([Bx-xUB,By-yUB]);

## Solution 2

tic

yUB=60; %y-position of upper bank

yLB=40; %y-position of lower bank

xl=0; %x-position of left boarder

xr=100; %x-position of right boarder

yl=0; %y-position of lower boarder

yu=100; %y-position of upper boarder

Ax=30; %x-position of City A

Ay=20; %y-position of City A

Bx=80; %x-position of City B

By=70; %y-position of City B

plot(Ax,Ay,'o','MarkerFaceColor',[1 0 0],'MarkerSize',15)

hold on

plot(Bx,By,'o','MarkerFaceColor',[0 1 0],'MarkerSize',15)

fill([xl;xl;xr;xr],[yLB;yUB;yUB;yLB],'b')

% replace these two lines by a brute force method

R=4;

nLmax=1E200;

for xLB=Ax:0.01:Bx

for xUB=xLB:0.01:Bx

nL=norm([xLB-Ax,yLB-Ay])+R\*norm([xUB-xLB,yUB-yLB])+ ...

norm([Bx-xUB,By-yUB]);

if nL<nLmax

nLmax=nL;

xLB\_best=xLB;

xUB\_best=xUB;

end

end

end

xLB=xLB\_best;

xUB=xUB\_best;

%################################################

plot([Ax,xLB,xUB,Bx],[Ay,yLB,yUB,By],'k','LineWidth',4);

xlabel('West-East-Position X[km]');

ylabel('South-North-Position Y[km]');

legend('City A','City B','River','Street')

axis(gca,[0,100,0,100])

toc



## Solution 3

R=0 -> Water costs nothing (like old loggers using rivers to transport their timber) -> Go straight to the river.



R=1 Water is the same as land. Cheapest street is the line from A to B.



R=1000  
Water is way more expensive than land -> Go (almost) straight through the water.

