**EASTERN MEDITERRANEAN UNIVERSITY**

 **Department of Industrial Engineering**

**IENG516 Network Flows**

**HOMEWORK 2 Spring 2016-17**

1. Solv the following network flow problem.(*b1=1, b4=-1, b3=b2=0*)

2

-2

1

2

4

4

1

-5

3

3

1. Suppose that the following figure represents a railroad network. The numbers beside each arc represent the time it takes to traverse the arc. Two locomotives are stationed at point 2 and three locomotives are at point 3. One locomotive is needed at point 5 and 4 locomotives are needed at point 6. Fine the minimum total time solution to get the power required to points 6 and 5.

4

2

2

2

5

3

1

1

3

1

2

3

6

4

4

1. Solve the following network flow problem.(*b1=3, b2=-1, b3=2,b4=-3*)(Use big-M method)

2

1

4

3

3

4

1

-2

3

1. Assume that in the simplex method for network flows problem *zpq-cpq=Max{ zij-cij, for all non-basic arcs (i,j)}<0*, and one of the artificial arcs is still in the associated spanning rooted tree of the current basis. What we can say for original problem? What is the situation when the same thing happens for the case which Δ tends to infinity?
2. Explain the dual problem of a minimal cost network flow problem in economical view of point. Assume that the original (primal) minimal cost network flow problem is infeasible then what will happen for dual problem? What will happen to dual problem when the primal problem is unbounded? *(Hint: please look at the primal and dual problems relationship in chapter 6)*
3. Solve the following network flow problem.

*bi*

2

1

-2

-3

*cij*

-2

1

-1

3

3

5

4

0

2

4

5

4

3

2

1. Solve the following transportation problem by the network simplex method.

