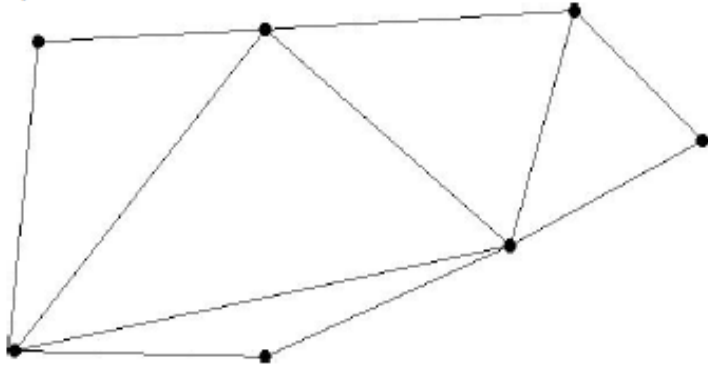
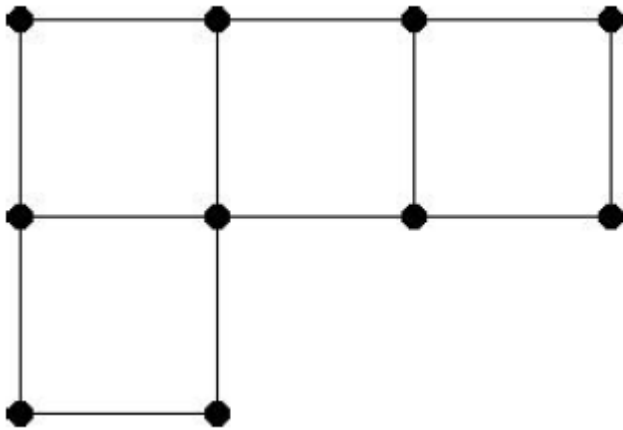


- Problem 2.** a) *State Euler's Theorem.*
b) *Determine if the graph below has an Eulerian Circuit.*



- c) *Find a good eulerization for the graph below using as few duplicated edges as possible.*



- Problem 3.** *This year Will wants to go to a home Cubs game, a home Bears game, a home Bulls game and watch one of his nephew's soccer games. If there are 81 Cubs games at home, 8 Bears games at home, 41 Bulls games at home and 12 soccer games, how many different ways can Will go to one of each?*

Problem 4. You are planning a roadtrip for a group of friends. You are planning on visiting three cities starting from Champaign. You have the following information for how much it will cost to get from one city to another

	Champaign	Chicago	Detroit	Indianapolis
Champaign	0	25	75	35
Chicago	25	0	65	100
Detroit	75	65	0	80
Indianapolis	35	100	80	0

- Draw a weighted graph that models this situation.
- Would a Eulerian or Hamiltonian Circuit be a more appropriate solution for this problem?
- Use the nearest-neighbor algorithm starting at Champaign to plan your trip.

Problem 5. For the following set of preference list ballots for 5 voters:

1 st	A	B	C	D	E
2 nd	B	C	B	C	D
3 rd	E	A	E	A	C
4 th	D	D	D	E	A
5 th	C	E	A	B	B

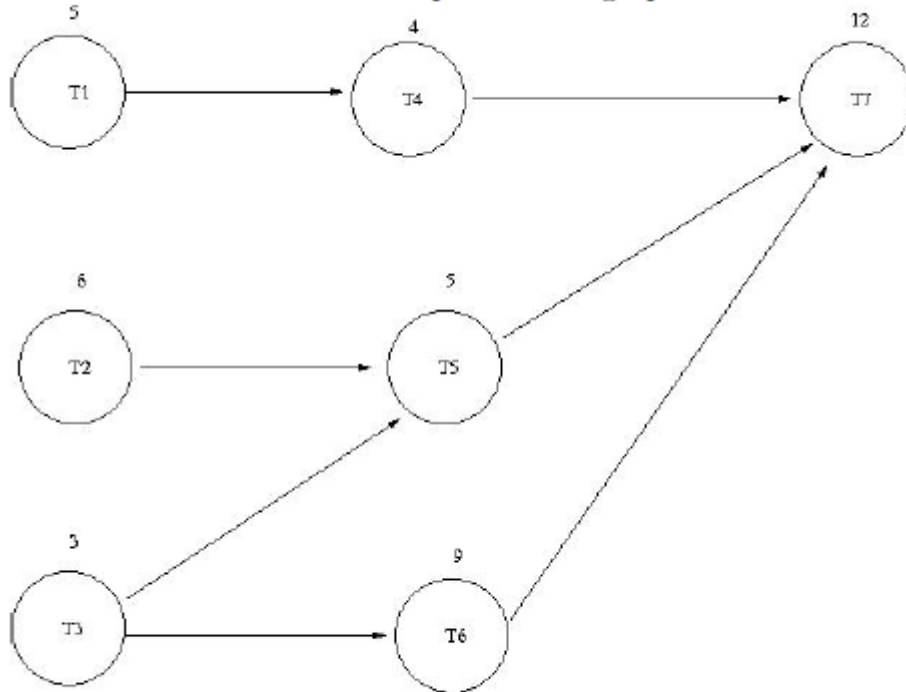
Determine the winner using:

- plurality voting.
- the Borda Count.
- the Hare System.
- sequential pairwise voting with the agenda *ABCDE*.

Problem 7. Give a description of each voting system and explain the flaw in each.

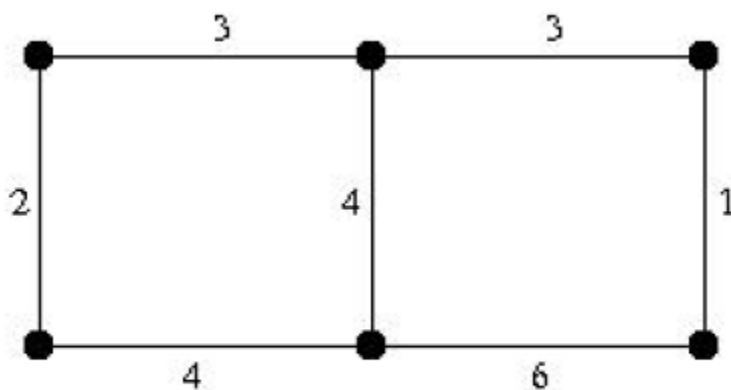
- Condorcet's Method.
- Plurality Runoff.
- Borda Count.

Problem 8. For the order-requirement digraph below.



- Which tasks need to be completed before T7 can be completed?
- Draw in the critical path and indicate how long it is.

Problem 9. The power company has just built a new plant. They have to build power lines to connect the plant to several cities. The graph below shows how much it would cost to build power lines.



- What should the power company do to minimize cost? What is the name of this in a graph?
- Find how the power company can minimize cost and power all the cities.

Problem 10. *The Baseball Hall of Fame uses Approval Voting in its elections. Let's imagine that this year there are only 5 voters and 10 candidates. The approval ballots are listed below, an X indicates an approval vote.*

Candidate	Voter 1	Voter 2	Voter 3	Voter 4	Voter 5
A	X		X	X	
B	X	X		X	
C		X	X	X	X
D	X				
E	X	X		X	
F		X		X	X
G	X	X	X	X	X
H					X
I	X		X	X	X
J	X			X	X

a) *The Hall of Fame requires 75% of the voter for a candidate to enter the Hall,*

which candidates will make it?

b) *If the Hall were using these ballots to select their "best player of all time," who would they choose?*