1. (30pts) A fraternity organizing a trip for spring break is deciding where to go. Its members were asked to rank their preferences among the following destinations: Cancun, Daytona Beach, Punta Cana or South Padre Island.

Votes	7	3	4	2	2	2	5	6	— 31 voters
1st	C	D	D	D	P	P	S	S	
2nd	D	S	C	P	C	C	D	P	
3rd	S	C	P	S	S	D	C	D	
4th	P	P	S	C	D	S	P	C	

a) Which choice wins the vote in a plurality election?
b) Which choice wins the vote in a plurality election with elimination?
c) Which choice is the pairwise comparison winner?
d) Which choice is the winner using Borda's method? Perform the check on the sum of Borda points.

a) C 7   = 7
   D 3+4+2 = 9
   P 2+2   = 4
   S 5+6   = 11 wins

b) 2nd round, P is out

   C 7+2+2 = 11
   D 9   = 9
   S 11   = 11

   3rd round, D is out

   C 11+4   = 15
   S 11+3+2 = 16 wins

c) C 7+2+2 = 11
   D 9+5+6 = 20 wins

   C 7+3+4+5 = 19 wins
   P 4+2+6 = 12

   C 7+4+2+2 = 15
   S 11+3+2 = 16 wins

   points:

C	D	P	S
1	3	0	2

   D 9+7+5 = 21 wins
   P 4+6   = 10

   D 9+7+2 = 18 wins
   S 11+2 = 13

   P 4+4+2 = 10
   S 11+7+3 = 21 wins

   D wins

d) C 7·4 + 8·3 + 8·2 + 8·1 = 76
   D 9·4 + 12·3 + 8·2 + 2·1 = 90 wins
   P 4·4 + 8·3 + 4·2 + 15·1 = 63
   S 11·4 + 3·3 + 11·2 + 6·1 = 81
                                ───
                                310

   31·10 = 310 ← checks out
        ↑
   1+2+3+4 pts per vote

2. (10pts) Determine whether each of the following graphs has an Euler path or an Euler circuit. If it does, find it, if not, explain why not.
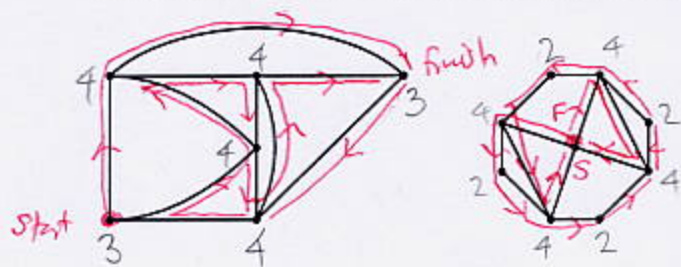
Has no odd vertices, hence graph has Euler circuit

Has two odd vertices
- has Euler path,
  dasn't have E, circuit

3. (20pts) A Tennessee salesman would like to visit Chattanooga, Knoxville, Memphis and Nashville while trying to minimize the distance traveled. The table below has the distances between the cities.

a) Draw a weighted graph that corresponds to this problem.

b) Use the brute force method to find the route that minimizes the distance traveled. First list all the possible orders of visits with Nashville the starting city.

c) Use the nearest neighbor algorithm to find an approximate solution to the problem. Is it the same as in b)?

	C	K	M
K	112		
M	322	387	
N	129	178	210

a)
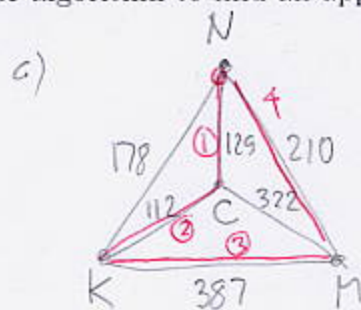
c) length is 838, not shortest,

NCKMN

b)
N C K M N   129 + 112 + 387 + 210 = 838
N C M K N   129 + 322 + 387 + 178 = 1016
N K C M N   178 + 112 + 322 + 210 = 822 shortest
N K M C N   178 + 387 + 322 + 129 = 1016
N M C K N   210 + 322 + 112 + 178 = 822
N M K C N   210 + 387 + 112 + 129 = 838