Assignment #9

10 points
1. Find a topological sort for the graph in file hw9_top_sort.jpg.

Choose paint color, Choose paint type, Choose wood type
purchase paint, purchase wood, paint wood, cut wood, assemble

10 points
2. For the graph in the file hw9_graph_letters.jpg, give a path of a breadth-first search,
starting from vertex I.

I, H, F, D, G, B, C, E, A

20 points
3. Find the single-source shortest path from Home to all of the other locations in the graph in
file hw9_points_of_interest.jpg. Show each step as in slides 57 to 64.

V	known	dv	pv
Home	F	0	0
City Park	F	∞	
Grocery	F	∞	
Restaurant	F	∞	
post office	F	∞	
UTD	F	∞	
Library	F	∞	
Stadium	F	∞	
Gas station	F	∞	

V	known	dv	pv
Home	T	0	0
City Park	F	5	Home
Grocery	F	∞	
Restaurant	F	15	Home
post office	F	∞	
UTD	F	20	Home
Library	F	∞	
Stadium	F	∞	
Gas station	F	6	Home

V	known	dv	pv
Home	T	0	0
City Park	T	5	Home
Grocery	F	7	City Park
Restaurant	F	15	Home
Post Office	F	∞	
UTD	F	20	Home
Library	F	∞	
Stadium	F	∞	
Gas station	F	6	Home

V	known	dv	pv
Home	T	0	0
City Park	T	5	Home
Grocery	F	7	City Park
Restaurant	F	15	Home
Post Office	F	∞	
UTD	F	20	Home
Library	F	∞	
Stadium	F	16	Gas Station
Gas station	T	6	Home

V	known	dv	pv
Home	T	0	0
City Park	T	5	Home
Grocery	T	7	City Park
Restaurant	F	15	Home
Post Office	F	∞	
UTD	F	20	Home
Library	F	∞	
Stadium	F	16	Gas Station
Gas station	T	6	Home

V	known	dv	pv
Home	T	0	0
City Park	T	5	Home
Grocery	T	7	City Park
Restaurant	T	15	Home
Post Office	F	19	Restaurant
UTD	F	20	Home
Library	F	18	Restaurant
Stadium	F	16	Gas Station
Gas station	T	6	Home

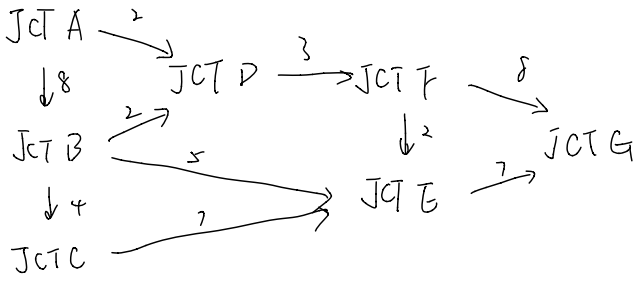
V	known	dv	pv
Home	T	0	0
City Park	T	5	Home
Grocery	T	7	City Park
Restaurant	T	15	Home
Post Office	F	19	Restaurant
UTD	F	20	Home
Library	F	18	Restaurant
Stadium	T	16	Gas Station
Gas station	T	6	Home

V	known	dv	pv
Home	T	0	0
City Park	T	5	Home
Grocery	T	7	City Park
Restaurant	T	15	Home
Post Office	F	19	Restaurant
UTD	F	20	Home
Library	T	18	Restaurant
Stadium	T	16	Gas Station
Gas station	T	6	Home

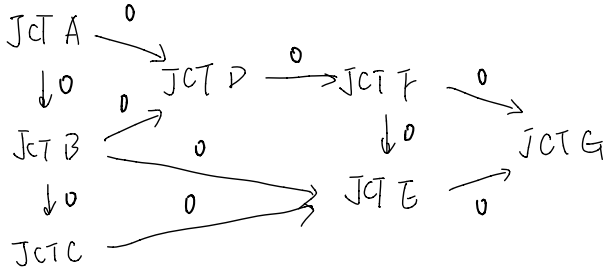
V	known	dv	pv
Home	T	0	0
City Park	T	5	Home
Grocery	T	7	City Park
Restaurant	T	15	Home
post office	T	19	Restaurant
UTD	F	20	Home
Library	T	18	Restaurant
Stadium	T	16	Gas Station
Gas station	T	6	Home

V	known	dv	pv
Home	T	0	0
City Park	T	5	Home
Grocery	T	7	City Park
Restaurant	T	15	Home
post office	T	19	Restaurant
UTD	T	20	Home
Library	T	18	Restaurant
Stadium	T	16	Gas Station
Gas station	T	6	Home

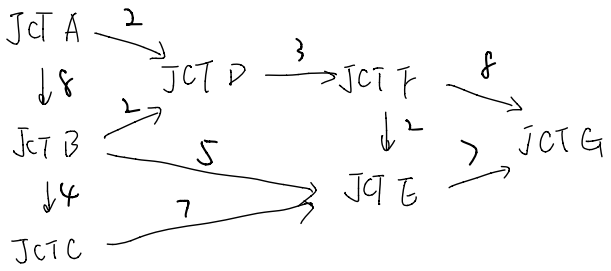
20 points
4. Find the maximum flow for from JCT A to JCT G for the graph in file hw9_dag_junctions.jpg.
Show each step as in slides 84 to 85.



Gf

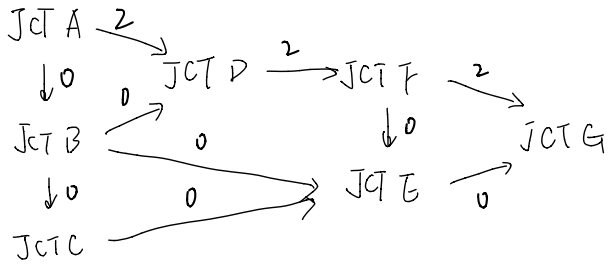


Gr



Choose path: JCT A, JCTD, JCT F, JCTG

Gf



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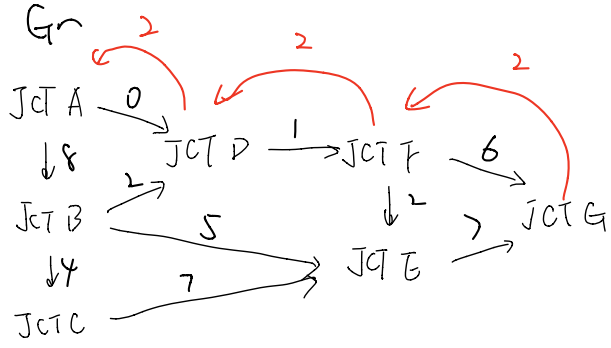
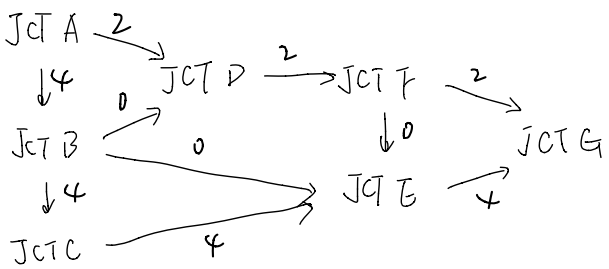


Choose path: JCT A, JCT B, JCT C, JCT E, JCT G.

Gf



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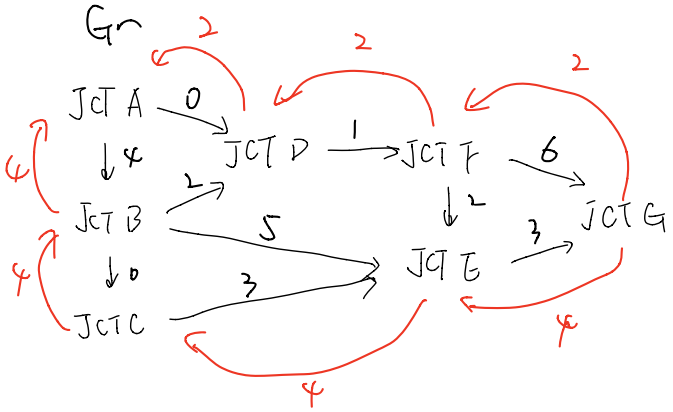
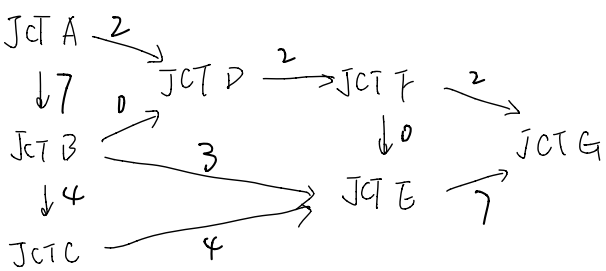


Choose path: JCT A, JCT B, JCT E, JCT G

Gf



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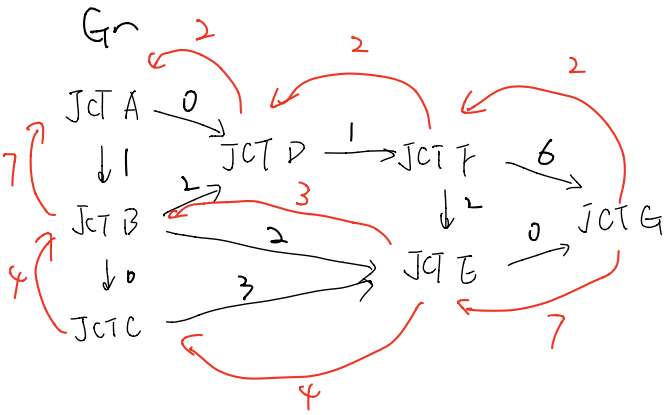
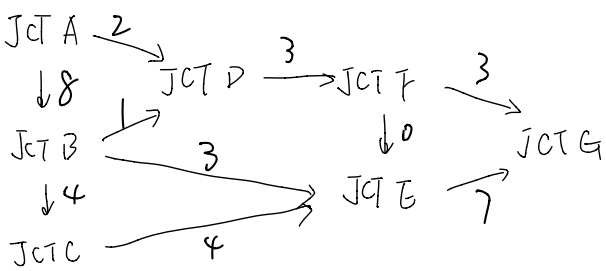
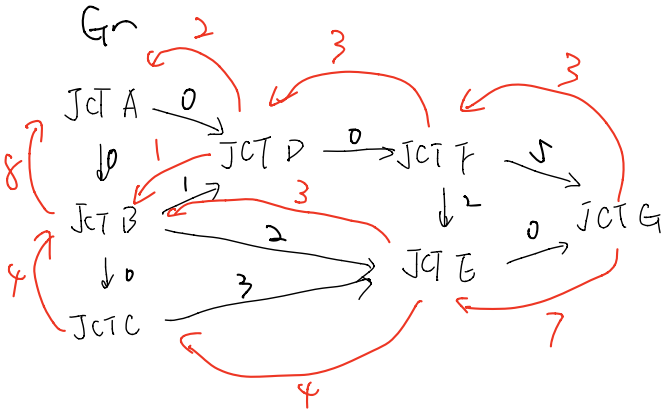


Choose path: JCT A, JCT B, JCT D, JCT F, JCT G

Gf

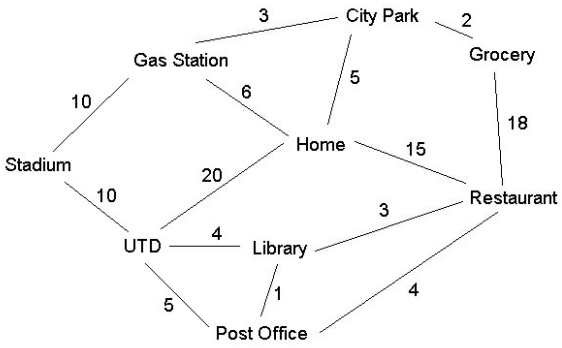


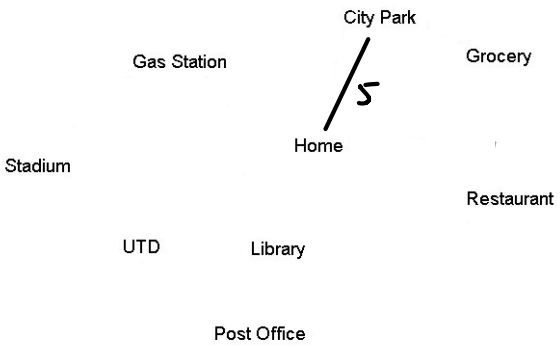
Gr

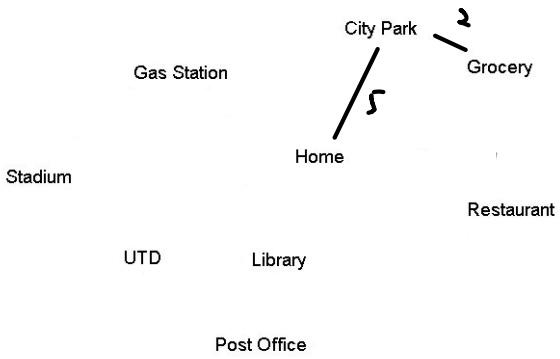


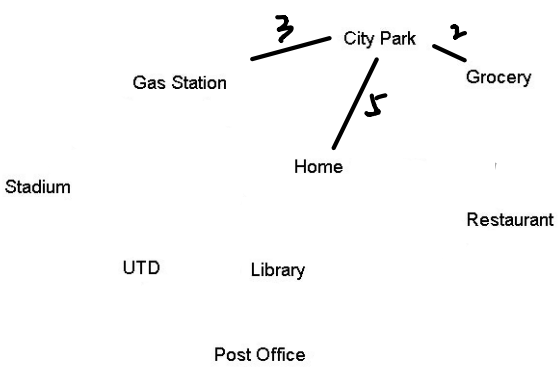
Max flow is 7+3=10

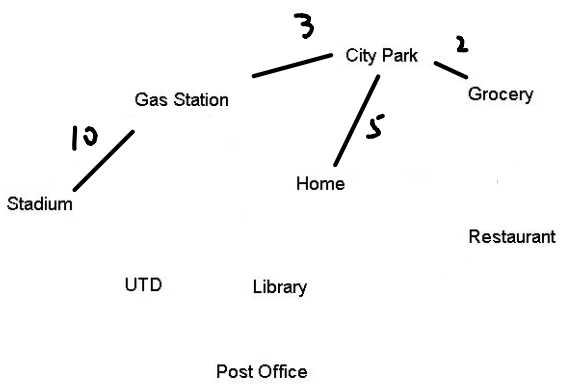
10 points
5. Find the minimum spanning tree using Prim's algorithm for the graph in file hw9_points_of_interest.jpg. Show each step as in slide 89.

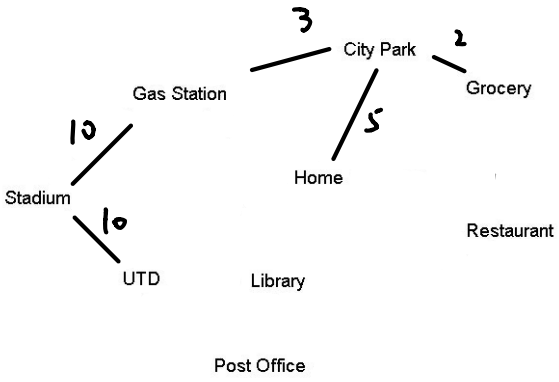


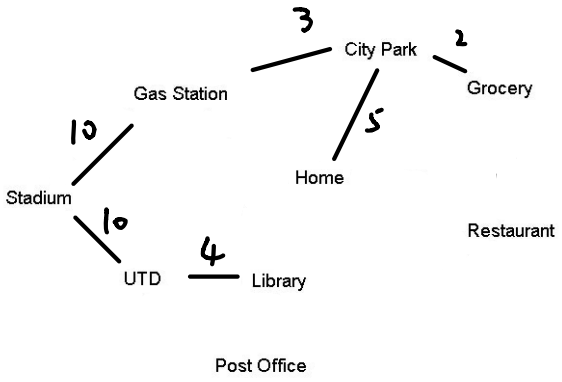


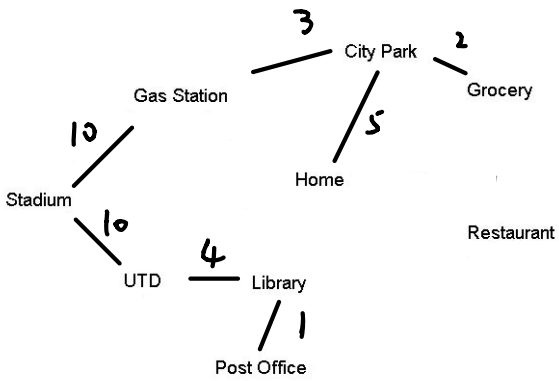


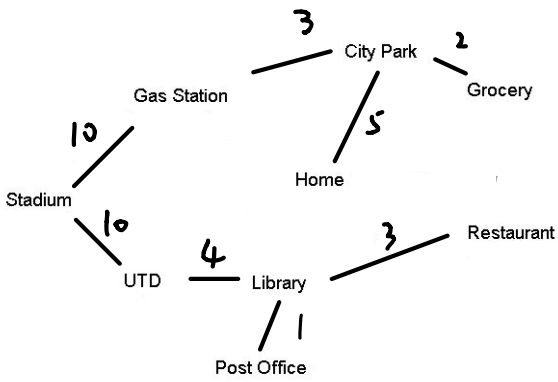




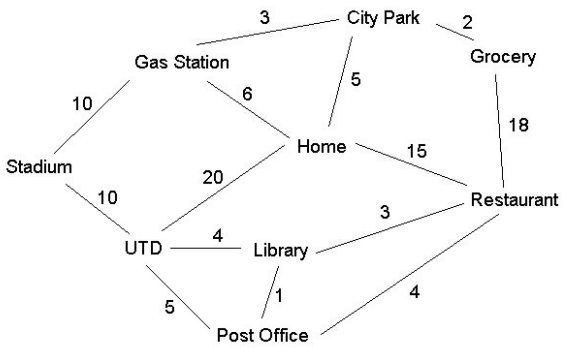


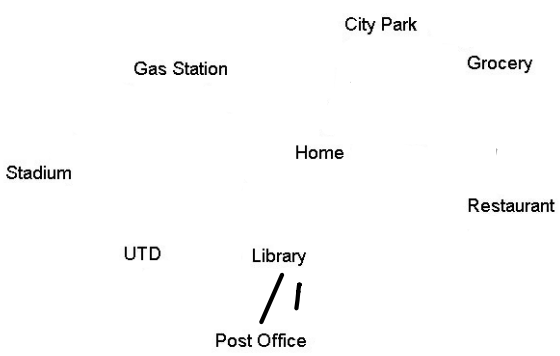


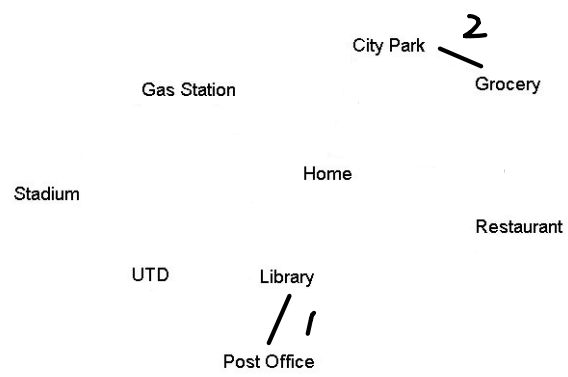


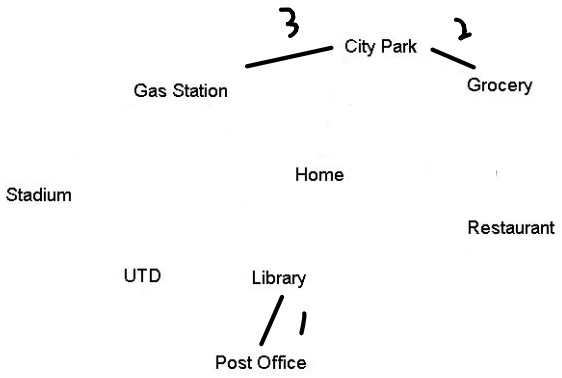


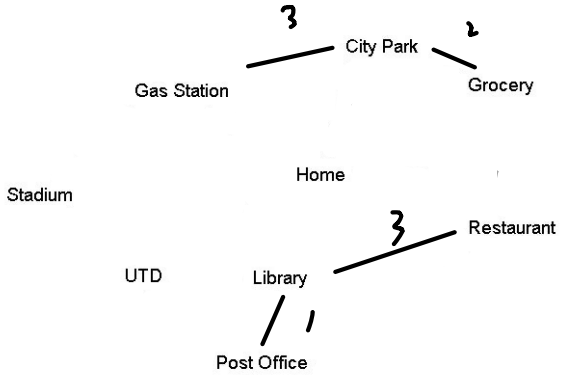
10 points
6. Repeat #5 using Kruskal's algorithm. Show each step as in slide 100.

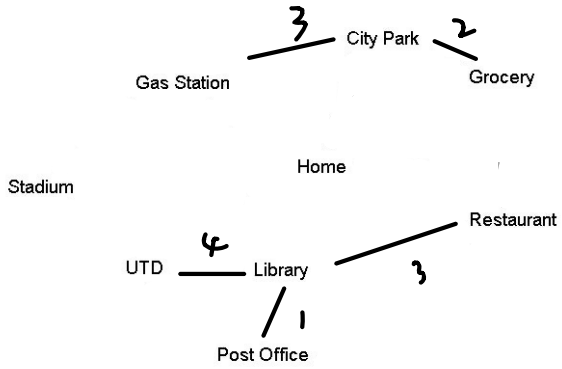


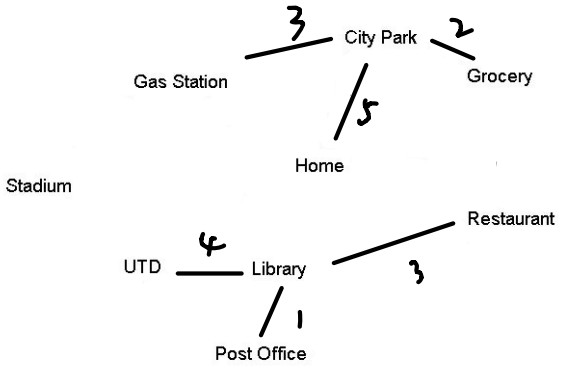


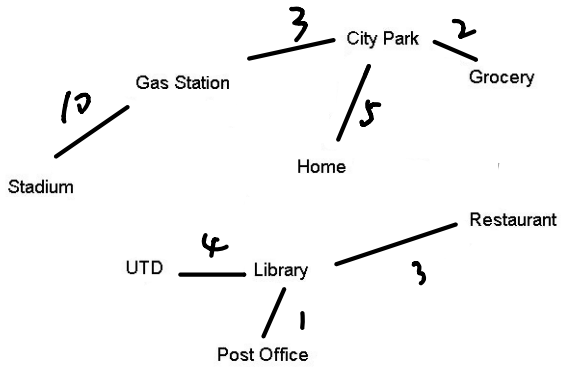


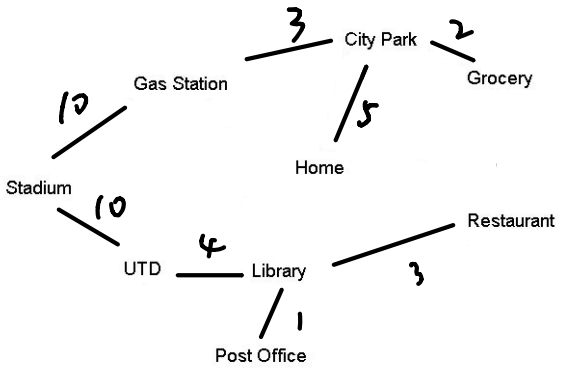








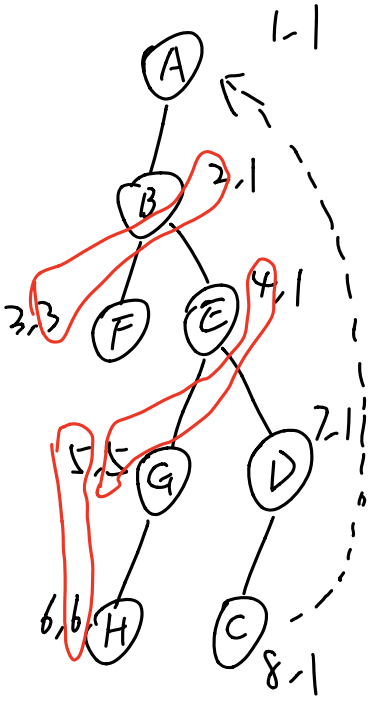




10 points

7. Produce a depth-first spanning tree for the graph in file hw9_graph_dfs.jpg. Show as in slide 124, labeling Num(v) and Low(v) for each vertex and identifying all articulation points.

Starting from A.



Articulation points : B、E、G

10 points
8. For the graph in the file hw9_graph_letters.jpg, does it have an Euler Path or Euler Circuit?
   If it does, give the sequence of letters for it.

It has an Euler path because B and I have odd degree.

B - E - G - H - I - F - B - A - C - D - I