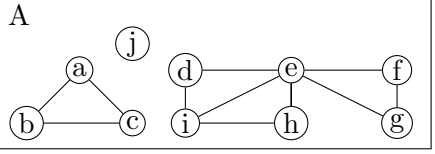
Math F113X: Homework Set 5

Answer the following problems from the Graph Theory section in the order assigned.
Introductory Problems: A, B, 3, 26, 34a
Minimum Weight Spanning Trees and Kruskal's Algorithm: C, D, 23
Shortest Paths and Dijkstra's Algorithm: 9, 10, 33

Problem A: Use the drawing of Graph A (in box) to answer the questions.

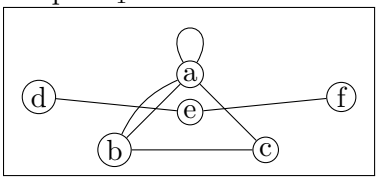
Graph A



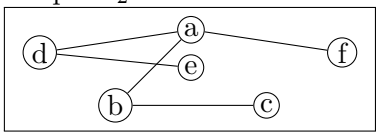
1. How many vertices does Graph A have?
2. How many edges does Graph A have?
3. What is the degree of vertex a? Vertex e? Vertex j?
4. For each sequence of vertices, determine if it is a **path**, a **circuit**, or **neither**.
   (a) abc
   (b) $abca$
   (c) $acid$
   (d) id
   (e) $gfedie$
   (f) $gedh$
   (g) a
5. Is Graph A connected? Justify your conclusion.

Problem B: (i) Which of the graphs below are **connected**? (ii) Which contain **circuits**? (iii) Determine the vertices of **highest** degree and those of **lowest** degree.(iv) Determine the number of vertices of **odd** degree.

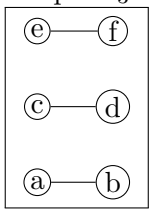
Graph B_1



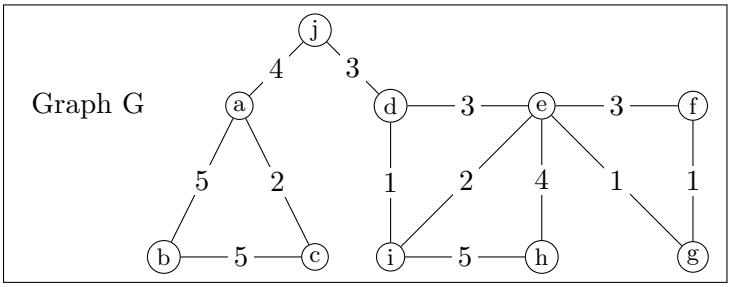
Graph B_2



Graph B_3



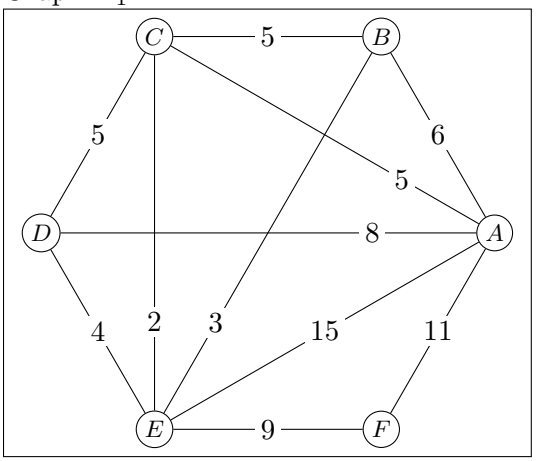
Problem C: Use the drawing of Graph G (in box) to answer the questions.



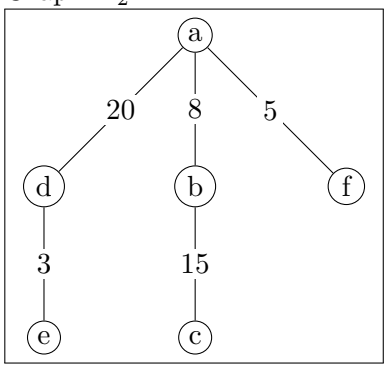
1. Draw two different spanning trees of Graph G.
2. Determine the total weight of each tree from part 1 above.
3. Find a minimum weight spanning tree.

Problem D: Use Kruskal's Algorithm to find a minimum cost spanning tree in each graph below. Make sure to show appropriate work.

Graph B_1



Graph B_2



Remember to write up your homework solutions according to the homework writeup guidelines.

Homework is graded using the following rubric for each problem (or problem part):

2 points: You provided a complete answer, with supporting work, written up clearly

1 point: Some attempt at a solution, but incomplete writeup / unclear / illegible / no answer

1 point: Only an answer, with no supporting work

0 points: Missing.

After you do the homework, you need to check your answers against the solutions! Then figure out your errors (if any) and revise your homework before you submit it.

Homework must be submitted on Gradescope.