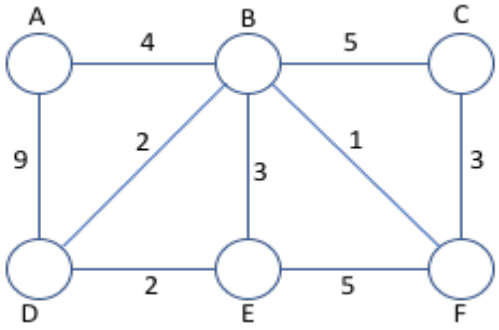
ENPM809X Homework #5
due May 11, 2023 4:00pm

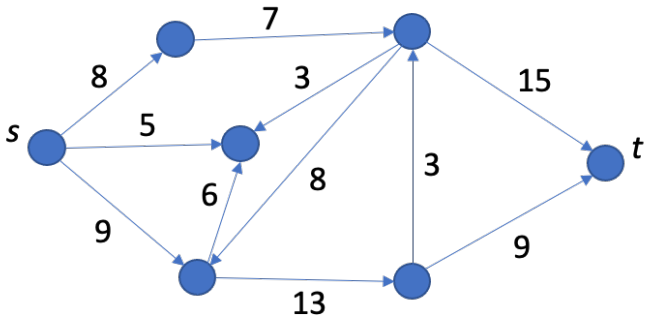
1) (30 points) Apply Prim's algorithm on the graph below, using vertex A as the root of the tree. Show the key and π values and the vertices in the spanning tree after each iteration of the algorithm.



2) (from Exercise 24.3-1) (30 points) Run Dijkstra's algorithm on the directed graph of Figure 24.2(a), using vertex z as the source. In the style of Figure 24.6, show the d and π values and the vertices in set *S* after each iteration of the while loop. Your graph should start with a distance of 0 at *z*, and infinity at all other vertices. You should draw a new graph that shows the new distances, the vertices in *S*, and the tree, after each iteration of the while loop.

3) A flow network *G* is shown in the figure below, where *s* is the source vertex, *t* is the sink vertex, and the numbers indicate the edge capacities.

a) **(20 points)** Use the Ford-Fulkerson algorithm to find a maximum flow in G. You can choose any suitable augmenting flow at each step of the algorithm, but clearly draw the residual network and the resulting flow after each step (using similar notation to Figure 26.6 in the textbook).



b) **(10 points)** What is the value of the maximum flow?

c) **(10 points)** Find a minimum cut of the network *G*.