Due by 1559 AST Wednesday, March 2, 2011 — **Show your work**

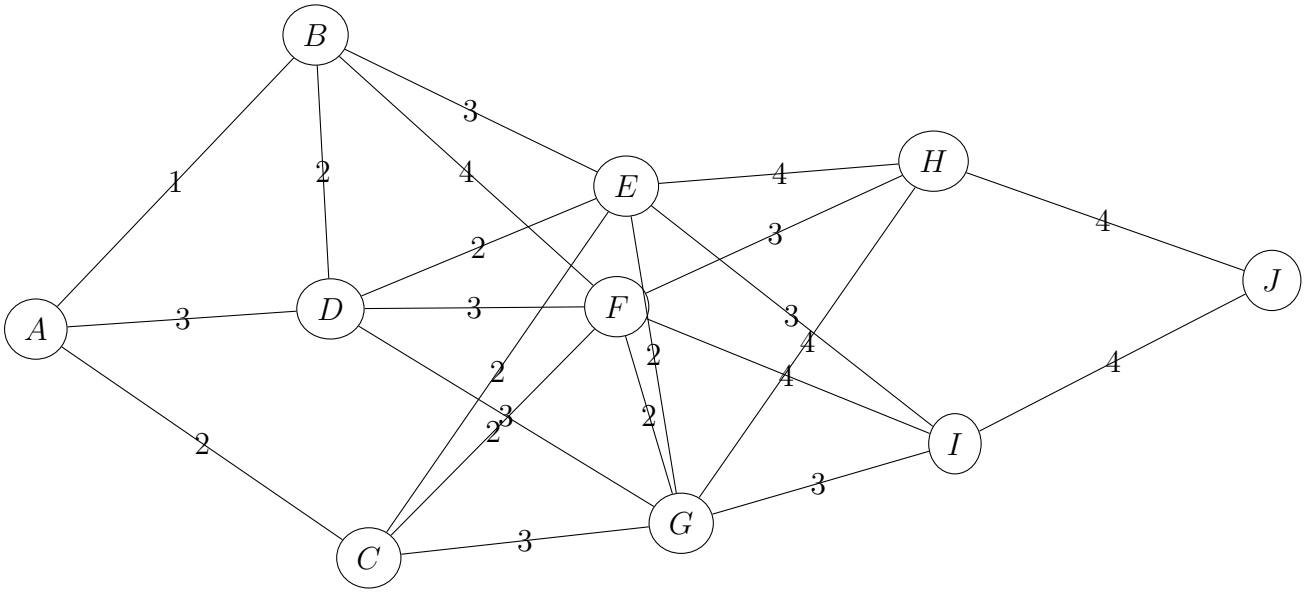
1. Use Kruskal's algorithm to find a minimum spanning tree in a graph whose adjacency matrix is as given (where entries give edge weights and 0 indicates no edge). Assume the vertices of the graph are ordered A to H. Indicate the order in which the edges were added.

$$\begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 1 & 1 & 0 \\ 0 & 2 & 2 & 0 & 2 & 2 & 0 & 2 \\ 1 & 2 & 1 & 0 & 0 & 1 & 1 & 1 \\ 1 & 0 & 0 & 2 & 2 & 0 & 2 & 2 \\ 0 & 2 & 0 & 2 & 1 & 0 & 0 & 0 \\ 1 & 2 & 1 & 0 & 0 & 2 & 0 & 1 \\ 1 & 0 & 1 & 2 & 0 & 0 & 1 & 1 \\ 0 & 2 & 1 & 2 & 0 & 1 & 1 & 2 \end{bmatrix}$$

2. Use Prim's algorithm to find a minimum spanning tree in the graph from question 1. Indicate the order in which the edges were added.

3. Sketch the graphs of x^2 and $2x^{\frac{1}{3}}$ in the first quadrant.

4. Use Dijkstra's algorithm to find the shortest path from A to J in the following graph. Include a list of the next closest vertex found and how far away it is.



5. Give the power function that is the same order as the following function:

   (a) $4x^4 + 3x^3 + 2x^2 + x$

   (b) $\sqrt[3]{x^2} + \sqrt{x^3} + \frac{1}{x^{-1}}$

   (c) $\frac{x^4 + \frac{x^5}{2}}{(x^2)^2}$

6. Prove or disprove: if $f(x) \in \Omega(g(x))$ then $g(x) \in \mathcal{O}(f(x))$.