Holen Yee
Graph Theory Homework #8

8.1)
Shortest path from A to G: $A \to B \to D \to C \to F \to E \to G$

8.2)
Shortest path from L to A: $L \to K \to I \to F \to H \to E \to B \to A$

8.3)
Algorithm for constructing the longest path from A to L:
First, run the shortest path algorithm to find the distance of the shortest path from L to each vertex in the graph. Then, we work starting from A. For each neighbor N of A which is not already on the path, calculate $g = \text{weight}(e_{AN}) - (\text{dist(A)} - \text{dist(N)})$, where $\text{weight}(e_{AN})$ is weight of the edge connecting A and N and $\text{dist}(A)$ and $\text{dist}(N)$ are the distances of the shortest paths from L to A and N respectively. The neighbor with the largest value of g is the next vertex in the path. Repeat this procedure with each new vertex in the path, until L is reached.
Longest path from A to L: $A \to E \to C \to F \to H \to J \to L$

8.4)
S to A: $S \to A$
S to B: $S \to B$
S to C: $S \to B \to C$
S to D: $S \to A \to D$
S to E: $S \to A \to D \to E$
S to F: $S \to B \to F$
S to T: $S \to B \to F \to T$

8.6)
The solution to the traveling salesman problem is $A \to B \to C \to E \to D \to A$ with distance 14.

8.7)
The Hamiltonian cycle with the greatest weight is $A \to C \to D \to B \to E \to A$ with a total weight of 32