Short answers

1. True or False? Circle your answers. No justification. **Wrong answers will receive a penalty of -1**.

   (a) (2 points) Performing one rotation always preserves the AVL property.
   A. True B. False

   (b) (2 points) In a r[illegible]st half of the nodes in a path from the root to a leaf are red.
   A. True B. F[illegible]

   (c) (2 points) The [illegible]visited by the depth-first search algorithm (DFS) algorithm is always strictl[illegible]der of the vertices returned by the breadth-first search algorithm (BFS) alg[illegible]
   A. True B. F[illegible]

   (d) (2 points) Let $P(n)$ be a property over a variable n. We want to prove by induction that $P(n)$ is true for all $n \geq n_0$. Assume the base case $P(n_0)$ is true. Then, for the inductive case, only assuming that $P(n-1)$ is true is always sufficient to prove that $P(n)$ is true too.
   A. True B. False

   (e) (2 points) If $f(n)$ is $O(g(n))$ then $g(n)$ is $O(f(n))$.
   A. True B. False

   (f) (2 points) We implement hash tables using the open addressing technique to solve conflicts. In this implementation, the load factor α cannot exceed 1.
   A. True B. False

   (g) (2 points) We run the depth-first search algorithm (DFS) on a graph G and identify a back edge. Thus, G has at least one cycle.
   A. True B. False

   (h) (2 points) Given a partition of the vertices of a weighted undirected graph, the cut has one and only one light edge.
   A. True B. False

   (i) (2 points) We run the Dijkstra's algorithm on a graph with a negative-weight cycle. Then, the algorithm could not terminate.
   A. True B. False

   (j) (2 points) A bipartite graph has no cycle.
   A. True B. False