1. **Short Answer**
(2 points each)

True or False: (circle one)

(a) **True or False** Kruskal's and Prim's algorithms are both greedy algorithms *Solution: True*

(b) **True or False** In Union-Find with path compression, if we do two Find-Set(x) operations back to back, the second operation will take $O(1)$ time *Solution: True: since x and all its ancestors become children of the root after the first operation.*

(c) **True or False** Kruskal's and Prim's algorithms both use the Union-Find data structure *Solution: False*

(d) **True or False**: If an operation takes $O(1)$ amortized time, then that operation takes $O(1)$ worst case time. *Solution: False: The worst case time could be larger*

(e) **True or False**: If an operation takes $O(1)$ worst case time then that operation takes $O(1)$ amortized time. *Solution: True*

(f) **True or False**: The greedy algorithm for $0-1$ knapsack always finds an optimal solution. *Solution: False*

(g) **True or False**: The greedy algorithm for fractional knapsack always finds an optimal solution. *Solution: True*

(h) **True or False** An edge x is a light edge for some cut which respects A if x is safe for A *Solution: False - see the hw problem on this*

(i) **True or False** An edge x is safe for some edge set A if x is a light edge for some cut which respects A *Solution: True*

(j) **True or False**: If X and Y are sequences that both begin with the character a, then some longest common subsequence of X and Y begins with the character a. *Solution: True*