Homework #8

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For all questions, choose the **best** answer.

1.

Let $G = (V, E) =$
$(\{1, 2, 3, 4, 5, 6, 7, 8\},$
$\{(1, 2, 4), (1, 3, 3), (1, 5, 8), (1, 8, 5), (2, 3, 11), (2, 6, 13), (3, 4, 7), (4, 5, 2), (4, 6, 15), (6, 7, 10), (7, 8, 12)\})$
be an undirected graph, where $\forall(u, v, w) \in E$,

- u is a vertex
- v is a vertex
- w is the edge-weight

In what order does Kruskal add edges to its MST?

(a) (4, 5, 2), (1, 3, 3), (1, 2, 4), (1, 8, 5), (3, 4, 7), (1, 5, 8), (6, 7, 10)

(b) (4, 5, 2), (1, 3, 3), (1, 2, 4), (1, 8, 5), (3, 4, 7), (7, 8, 12), (2, 6, 13)

(c) (4, 5, 2), (1, 3, 3), (1, 2, 4), (1, 8, 5), (3, 4, 7), (6, 7, 10), (2, 6, 13)

(d) (4, 5, 2), (1, 3, 3), (1, 2, 4), (1, 8, 5), (3, 4, 7), (6, 7, 10), (7, 8, 12)

(e) None of the above

2.

In what order does Prim add edges to its MST if the start-vertex is 1?

(a) (1, 3, 3), (1, 8, 5), (4, 5, 2), (1, 2, 4), (3, 4, 7), (6, 7, 10), (7, 8, 12)

(b) (1, 3, 3), (1, 2, 4), (1, 8, 5), (3, 4, 7), (4, 5, 2), (7, 8, 12), (6, 7, 10)

(c) (1, 3, 3), (1, 2, 4), (1, 8, 5), (3, 4, 7), (4, 5, 2), (3, 2, 11), (7, 8, 12)

(d) (1, 3, 3), (1, 2, 4), (1, 8, 5), (3, 4, 7), (1, 5, 8), (7, 8, 12), (6, 7, 10)

(e) None of the above

3.

What data structure is best suited for implementation of Kruskals's algorithm, and why?

(a) A static-sized array tracking all edges from least-to-most expensive, because of the speed in updating all edge values within the array.

(b) A dynamically-sized heap tracking the vertex of lowest cost to add to the MST, because of traversal speed through the heap.

(c) A static-sized array tracking all edges from least-to-most expensive, because of traversal speed through the array.

(d) A dynamically-sized heap tracking the vertex of lowest cost to add to the MST, because of the speed in updating minimum vertex costs.

(e) None of the above

4.

What data structure is best suited for implementation of Prim's algorithm, and why?

(a) A static-sized array tracking all edges from least-to-most expensive, because of the speed in updating all edge values within the array.

(b) A dynamically-sized heap tracking the vertex of lowest cost to add to the MST, because of traversal speed through the heap.

(c) A static-sized array tracking all edges from least-to-most expensive, because of traversal speed through the array.

(d) A dynamically-sized heap tracking the vertex of lowest cost to add to the MST, because of the speed in updating minimum vertex costs.

(e) None of the above

5.

A *feedback edge set* in a connected graph is a subset of the edges of the graph such that their removal from the graph causes the graph to become acyclic. Given the graph in Figure 1, find the feedback edge set with minimum total weight.

(a) { (a, f), (a, b), (f, b), (b, e), (b,d), (e, d) }

(b) { (a, b), (a, d), (a, f), (b, f), (b,e) }

(c) { (f, e), (f, c), (b, e) }

(d) { (a, f), (a, d), (f,b), (f,c) }

(e) None of the above

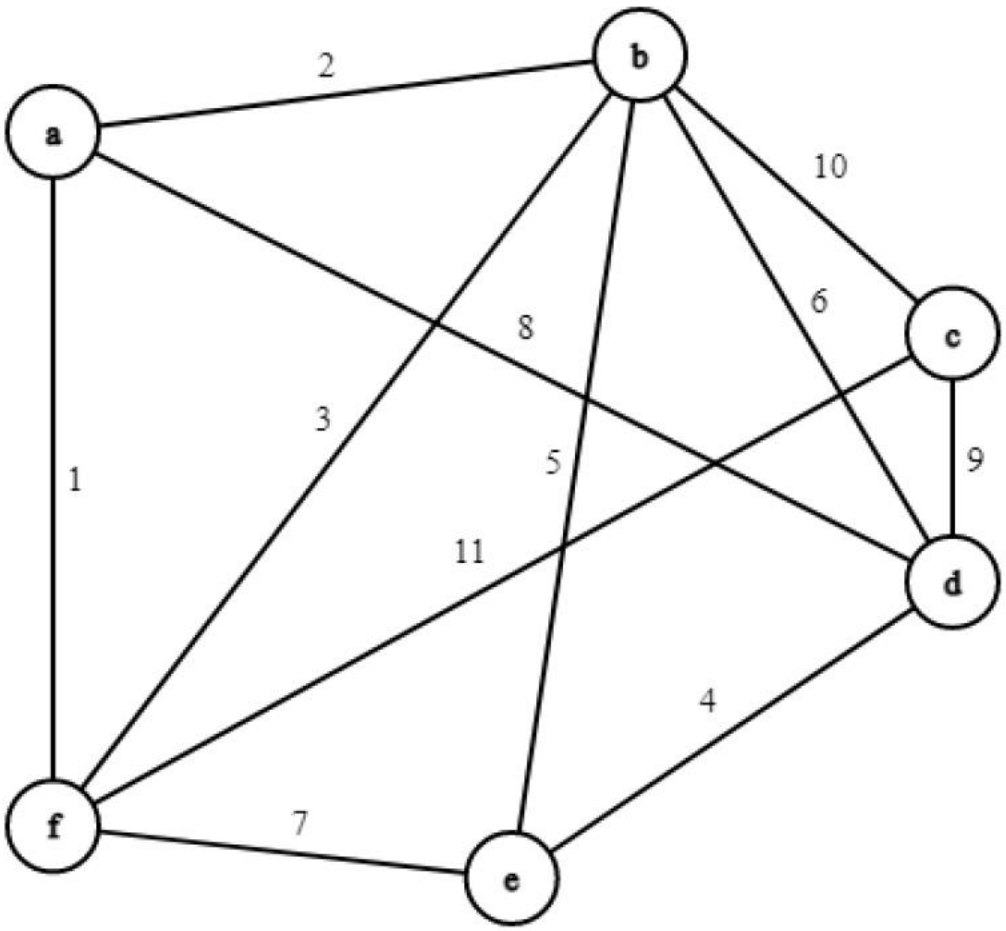

Figure 1