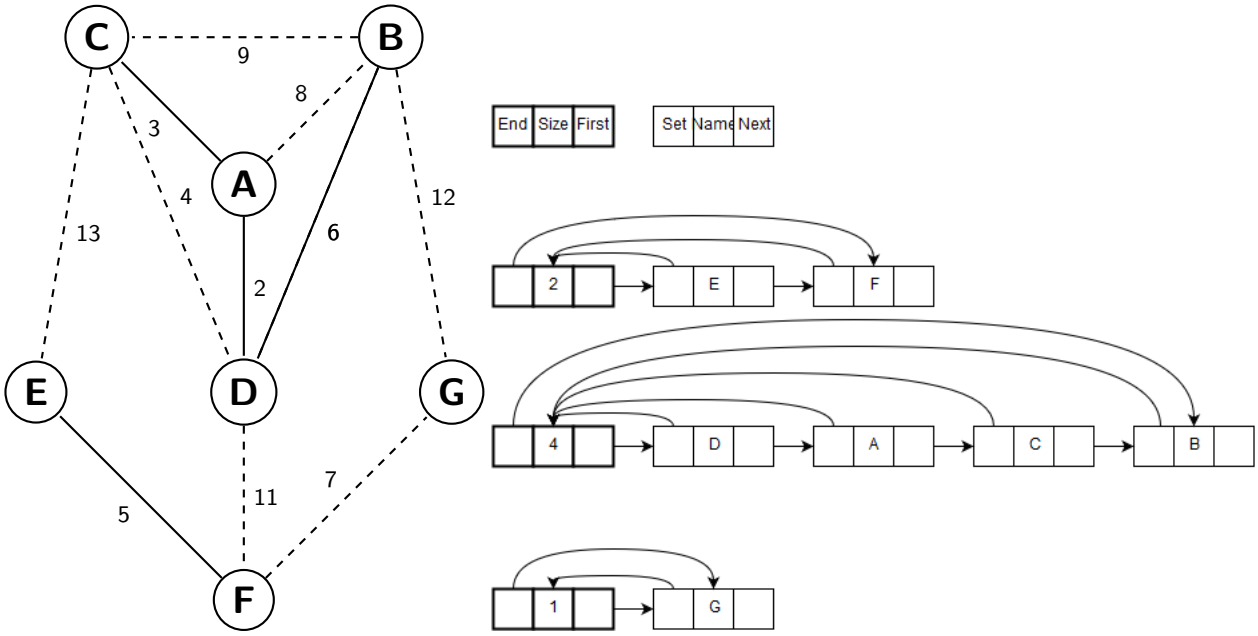
CMPSCI 311: Introduction to Algorithms **Spring 2018**

Discussion 4

2/22/2018 Name:

Instructions. You will form groups to work on these problems in discussion section. Please turn in your own sheet in at the end of class.

1. **Union-Find** Below is a graph mid-Kruskal's algorithm and its union-find datastructure. Draw the Union-Find datastructure when the algorithm is done.



2. **Minimum Spanning Trees.** The below algorithm `mstFind` does not work in some cases.

Algorithm 1 `mstFind`$(G(E, V))$

for every v in V **do**
  $a \leftarrow$ edge of v with least weight
  add a to result
end for

(a) Find a graph with cycles where `mstFind` produces an MST. All edges of the graph must have unique weights.

(b) Find a connected graph where `mstFind` produces multiple disconnected trees. All edges must have unique weights.

(c) Run Prim's Algorithm on both of your graphs.

(d) Run Kruskal's Algorithm on both of your graphs.

(e) Say that G is a graph where all edges have unique weights. Is it possible that `mstFind` will output a graph with cycles when run on G?