**Kruskal’s Algorithm**

In which order does Kruskal’s algorithm select edges in the MST?

**Q1:** In which order does Kruskal’s algorithm select edges in the MST?

**Prim’s Algorithm**

In which order does Prim’s algorithm select edges in the MST? Start from vertex s.

**Q1:** In which order does Prim’s algorithm select edges in the MST? Start from vertex s.
Adding a Constant

In a graph $G$ with unique edge weights, do the edges of the (unique) MST change if we add 1000 to every edge weight?

Q1: In a graph $G$ with unique edge weights, do the edges of the (unique) MST change if we add 1000 to every edge weight?

Multiplying by a Constant

In a graph $G$ with unique edge weights, do the edges of the (unique) MST change if we multiply 1000 to every edge weight?

Q1: In a graph $G$ with unique edge weights, do the edges of the (unique) MST change if we multiply 1000 to every edge weight?
Suppose the bold edges form a MST. Will the MST change as a result of introducing one new edge with weight $w$?

1. If $w < 1$, ...
2. If $1 < w < 5$, ...
3. If $5 < w < 9$, ...
4. If $9 < w$, ...

Secret Edge

Q1: Suppose $x$ is an unknown edge weight. Can the bold edges be a MST? If so, for what values of $x$? If not, why not?

Q2: If $1 < w < 5$, ...

Q3: If $5 < w < 9$, ...

Q4: If $9 < w$, ...

Unknown Edge Weight

Q1: Suppose $x$ is an unknown edge weight. Can the bold edges be a MST? If so, for what values of $x$? If not, why not?
Maximum Spanning Tree

Maximum spanning tree. Given an undirected graph $G$ with positive edge weights, find a spanning tree that maximizes the sum of the edge weights.

Design an algorithm to find a maximum spanning tree in $O(E \log E)$ runtime.

Min-Product Spanning Tree

Min-product spanning tree. Given an undirected graph $G$ with positive edge weights, find a spanning tree that minimizes the product of the edge weights.

Design an algorithm to find a min-product spanning tree in $O(E \log E)$ runtime.

Q1: Design an algorithm to find a maximum spanning tree in $O(E \log E)$ runtime.

Q1: Design an algorithm to find a min-product spanning tree in $O(E \log E)$ runtime.