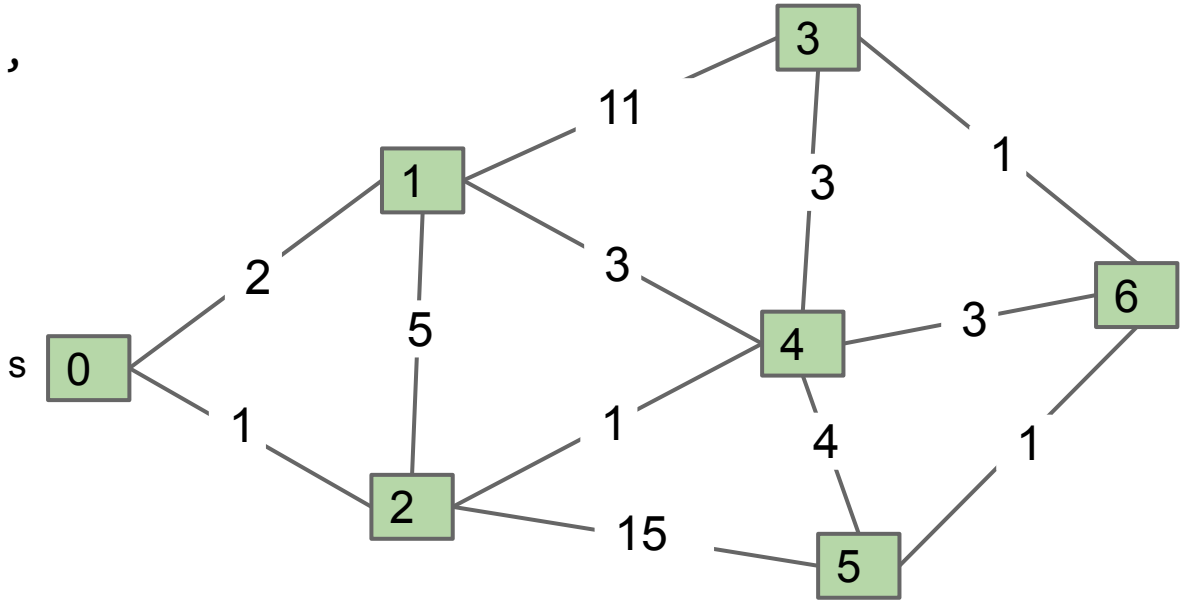
Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (0-2: 1), (2-4: 1),
(3-6: 1), (5-6: 1),
(0-1: 2), (4-1: 3),
(3-4: 3), (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



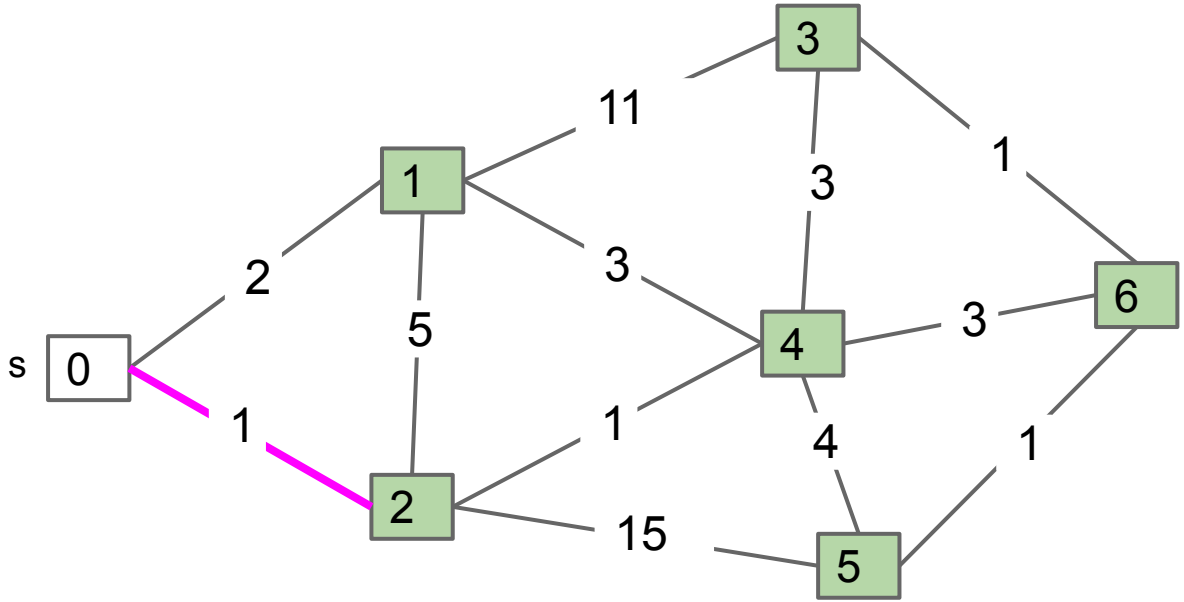

```
WQU: []

MST: []
```

Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (2-4: 1),
(3-6: 1), (5-6: 1),
(0-1: 2), (4-1: 3),
(3-4: 3), (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



Removed edge: e=0-2

Cycle? isConnected(0, 2)

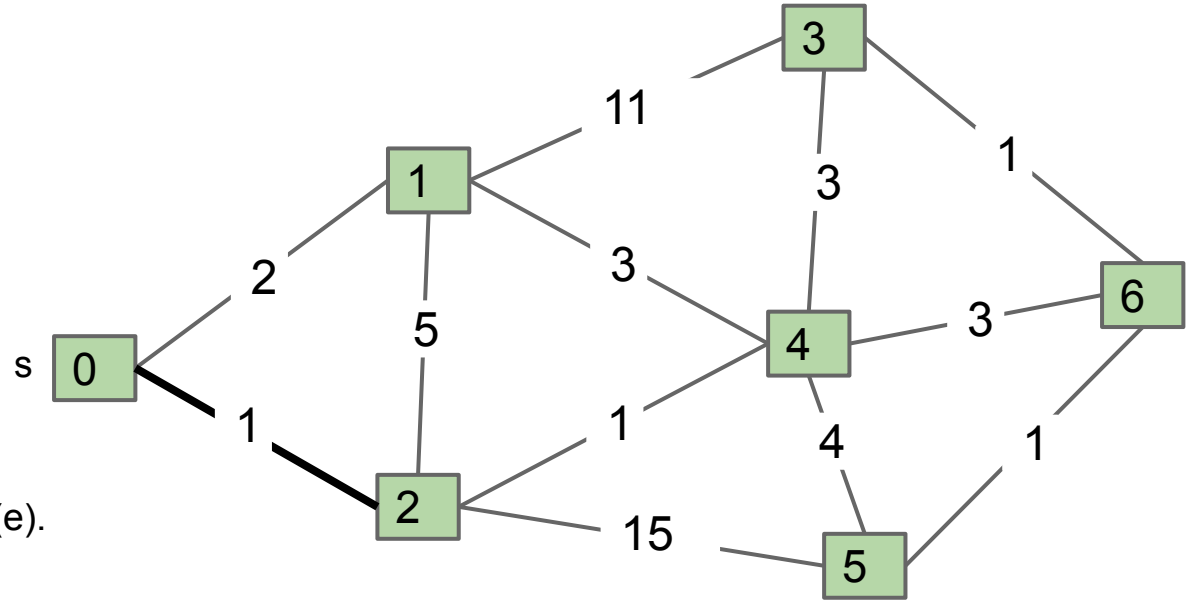
```
WQU: []

MST: []
```

Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (2-4: 1),
(3-6: 1), (5-6: 1),
(0-1: 2), (4-1: 3),
(3-4: 3), (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



Removed edge: e=0-2

Cycle? No. union(0, 2). add(e).

WQU: [0-2]

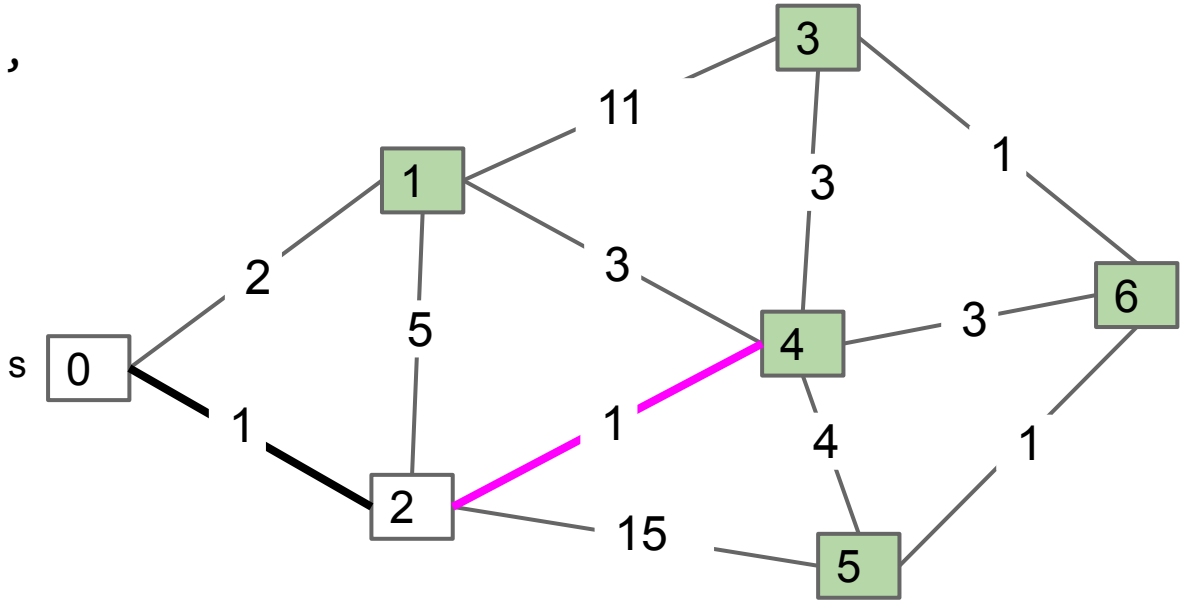
MST: [0-2]

Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (3-6: 1), (5-6: 1),
(0-1: 2), (4-1: 3),
(3-4: 3), (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



Removed edge: e=2-4

Cycle? isConnected(2, 4)

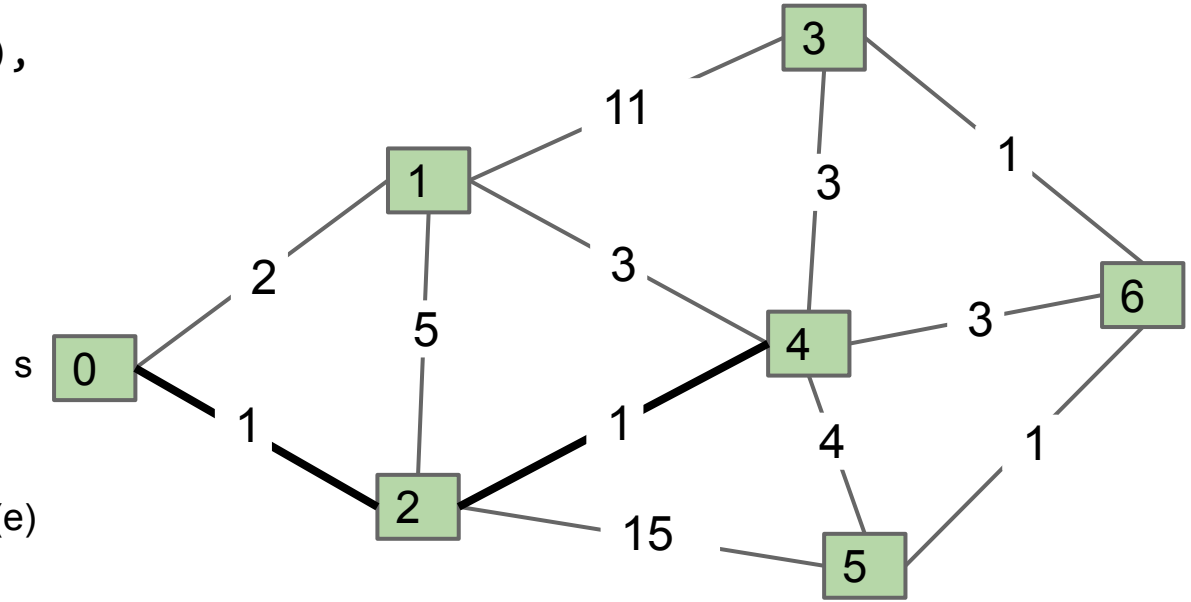
```
WQU: [0-2]

MST: [0-2]
```

Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (3-6: 1), (5-6: 1),
(0-1: 2), (4-1: 3),
(3-4: 3), (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



Removed edge: e=2-4

Cycle? No. union(2, 4). add(e)

WQU: [0-2-4]

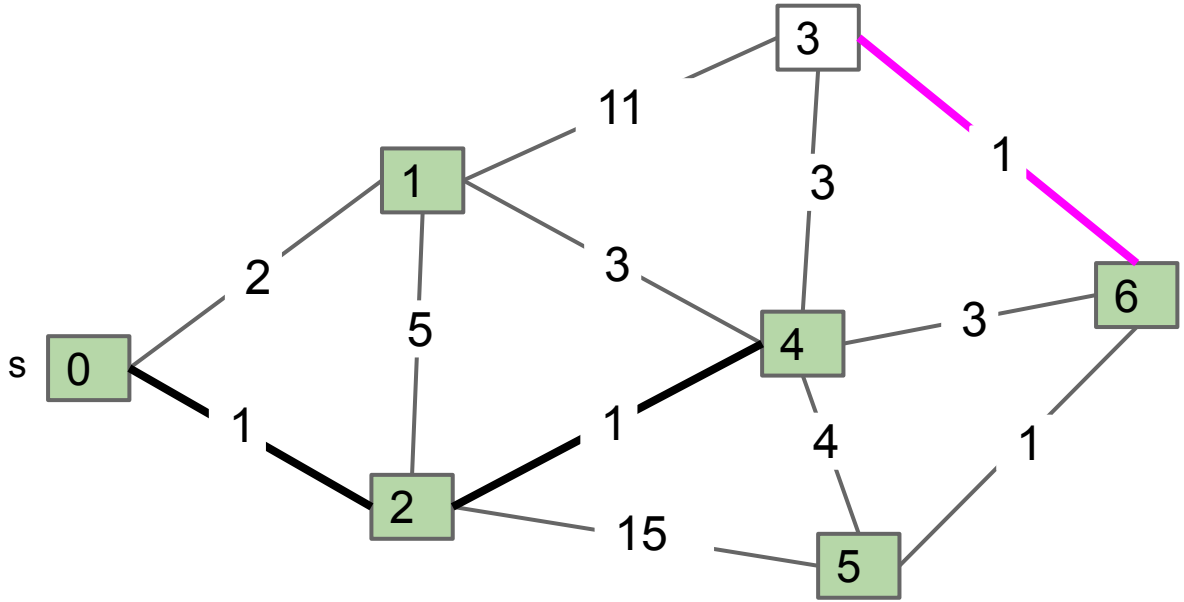
MST: [0-2, 2-4]

Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (5-6: 1),
(0-1: 2), (4-1: 3),
(3-4: 3), (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



Removed edge: 3-6

Cycle? isConnected(3, 6)

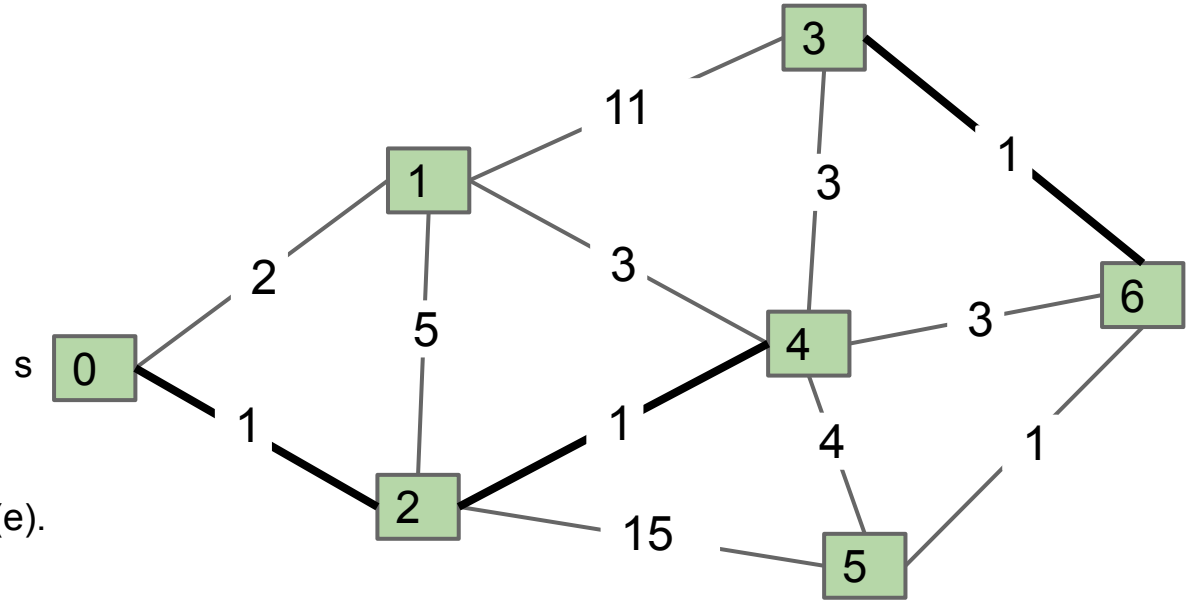
```
WQU: [0-2-4]

MST: [0-2, 2-4]
```

Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (5-6: 1),
(0-1: 2), (4-1: 3),
(3-4: 3), (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



Removed edge: e=3-6

Cycle? No. union(3, 6). add(e).

WQU: [0-2-4, 3-6]

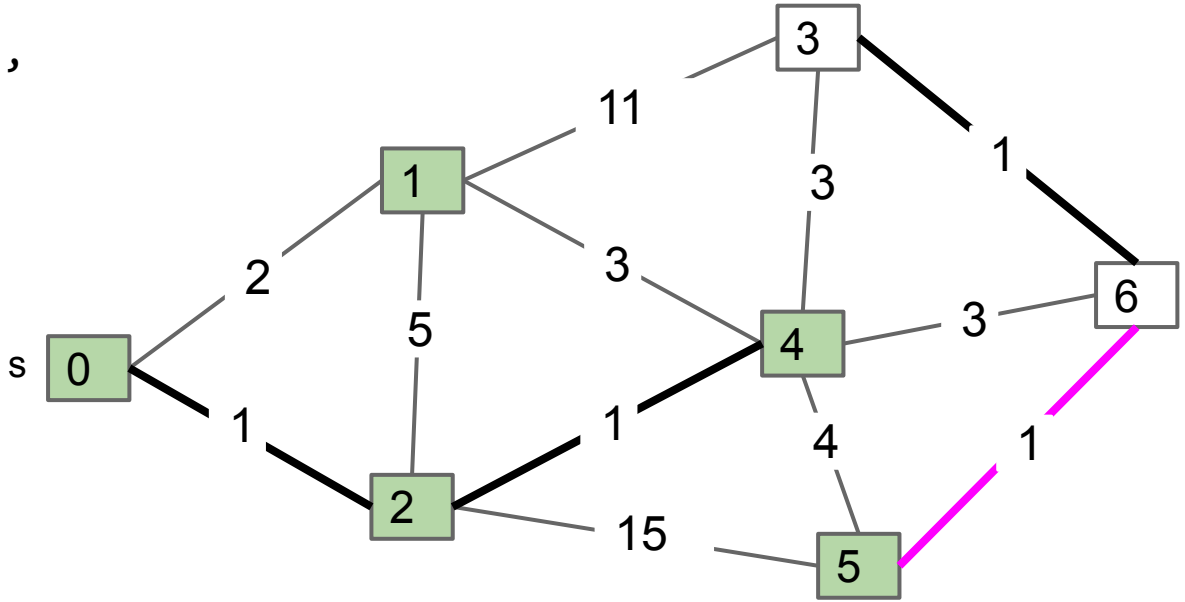
MST: [0-2, 2-4, 3-6]

Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (0-1: 2), (4-1: 3),
(3-4: 3), (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



Removed edge: e=5-6

Cycle? isConnected(5, 6)

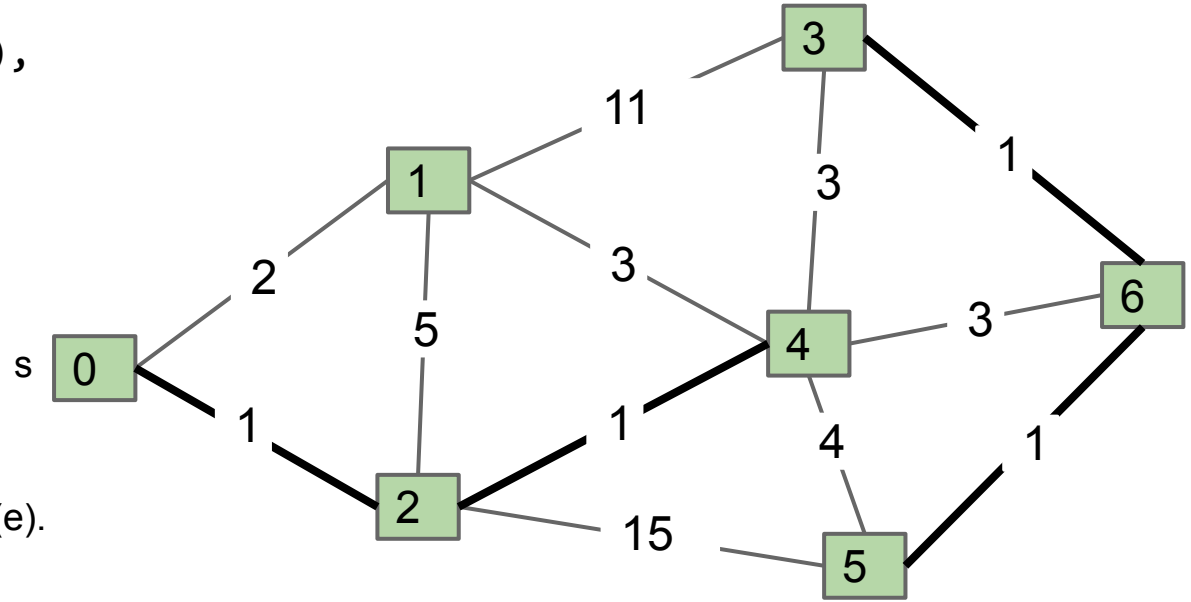
```
WQU: [0-2-4, 3-6]

MST: [0-2, 2-4, 3-6]
```

Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (0-1: 2), (4-1: 3),
(3-4: 3), (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



Removed edge: e=5-6

Cycle? No. union(5, 6). add(e).

WQU: [0-2-4, 3-6-5]

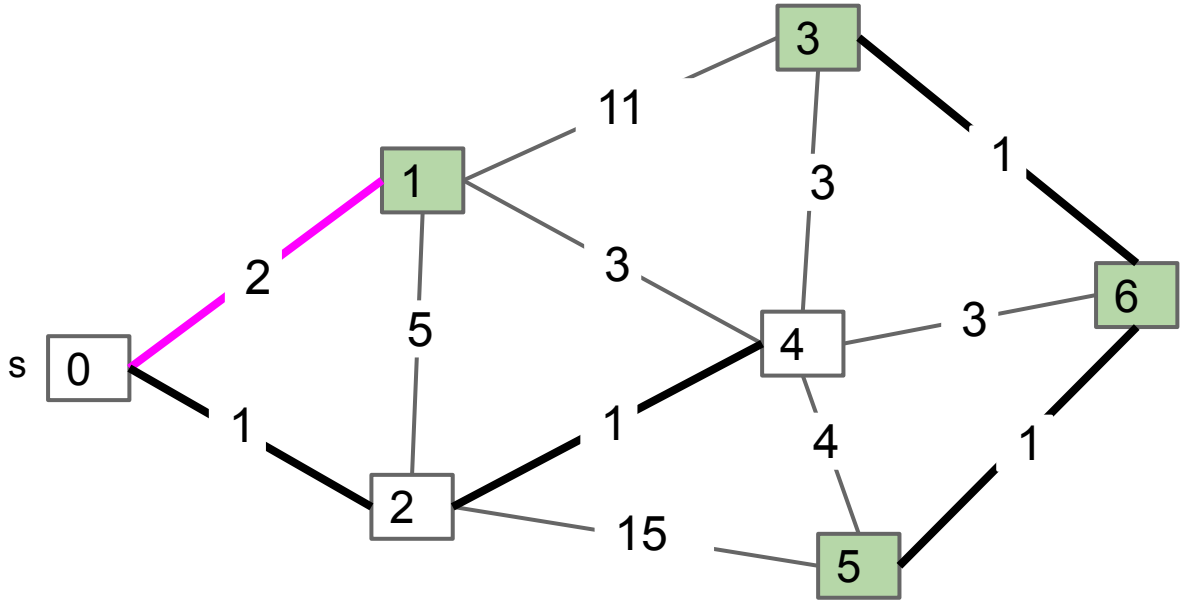
MST: [0-2, 2-4, 3-6, 5-6]

Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (4-1: 3),
(3-4: 3), (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



Removed edge: e=0-1

Cycle? isConnected(0, 1)

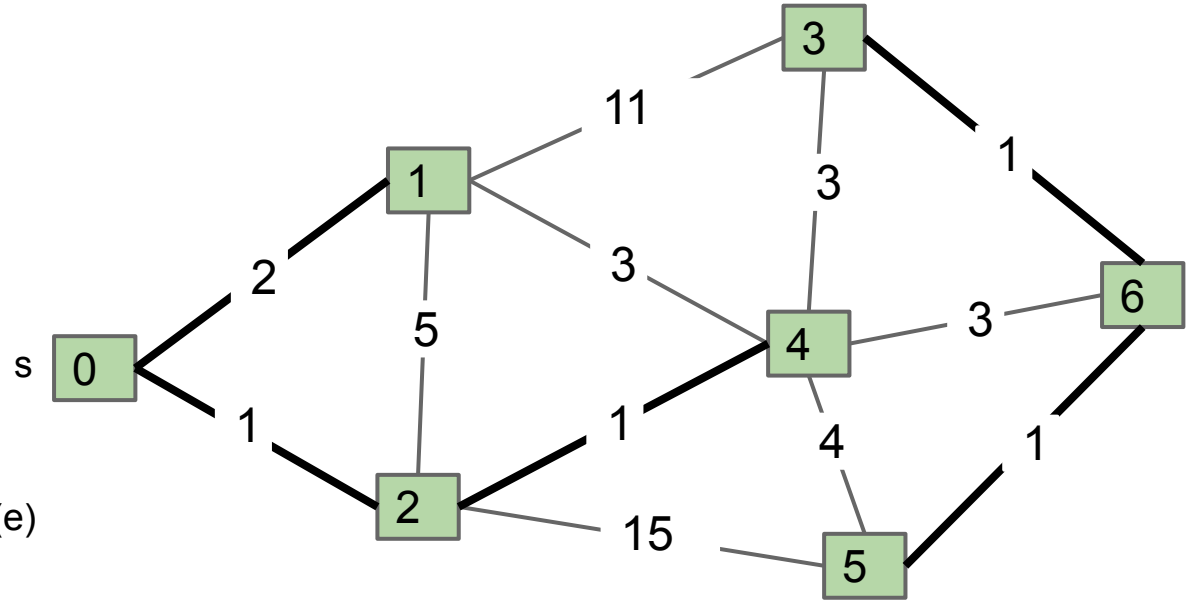
```
WQU: [0-2-4, 3-6-5]

MST: [0-2, 2-4, 3-6, 5-6]
```

Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (4-1: 3),
(3-4: 3), (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



Removed edge: e=0-1

Cycle? No. union(0, 1). add(e)

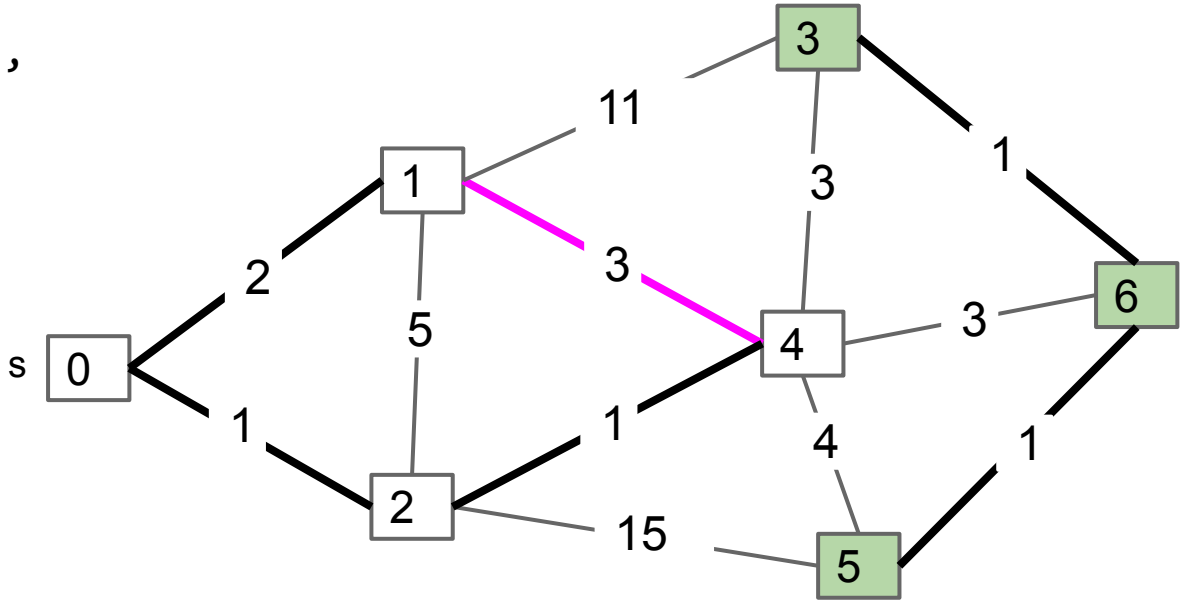
```
WQU: [0-2-4-1, 3-6-5]

MST: [0-2, 2-4, 3-6, 5-6, 0-1]
```

Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (3-4: 3), (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



Removed edge: e=1-4

Cycle? isConnected(1, 4)

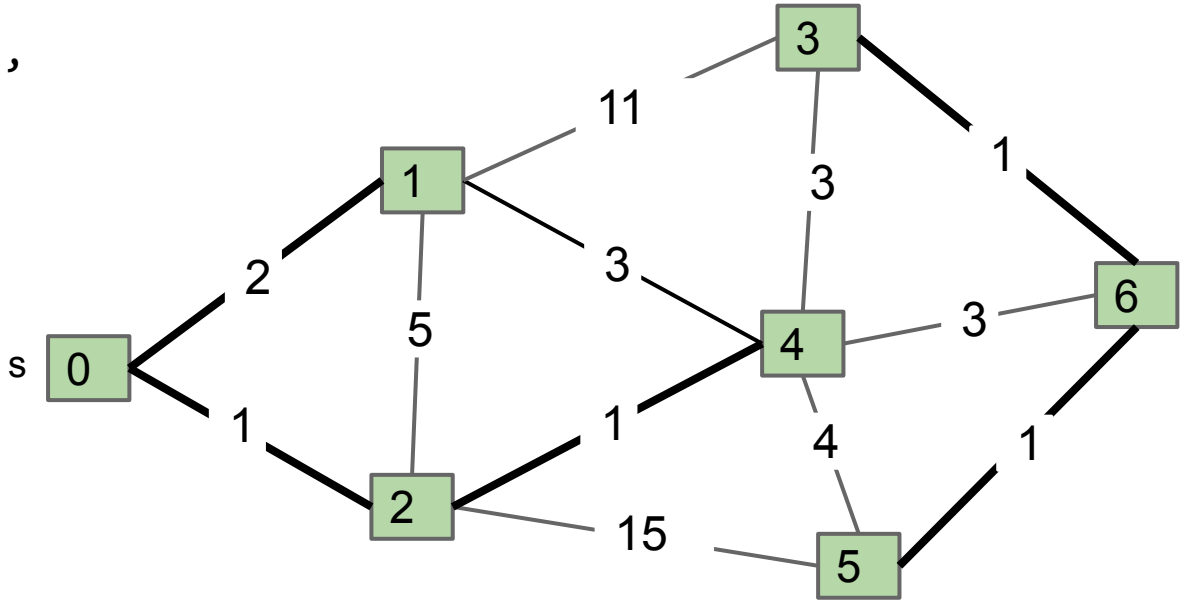
```
WQU: [0-2-4-1, 3-6-5]

MST: [0-2, 2-4, 3-6, 5-6, 0-1]
```

Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (3-4: 3), (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



Removed edge: e=1-4

Cycle? Yes. Do nothing.

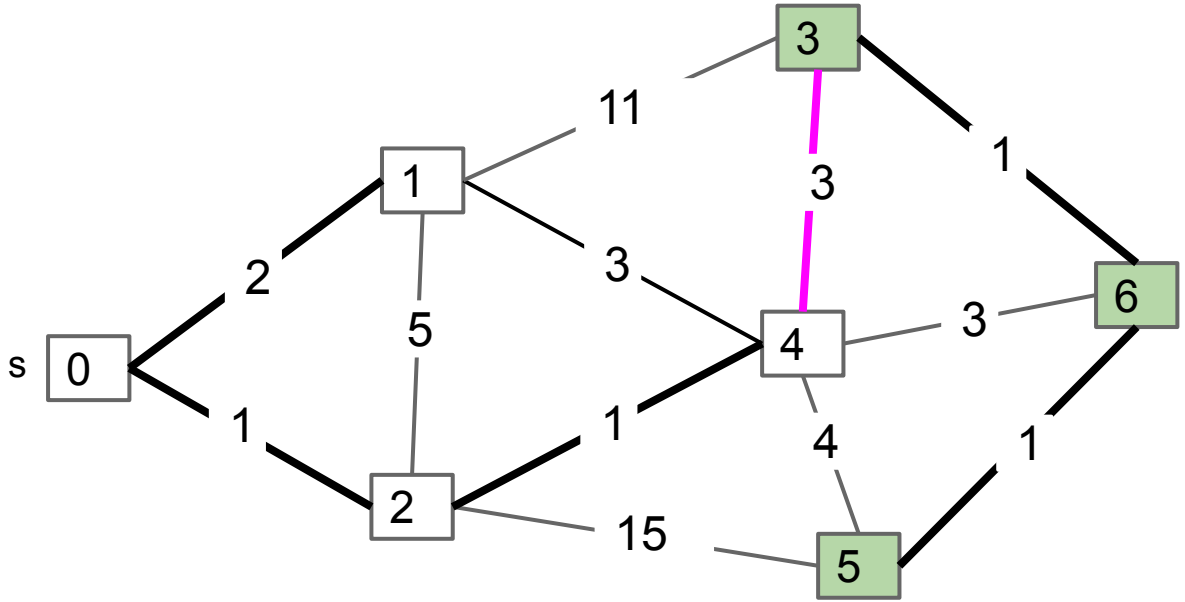
```
WQU: [0-2-4-1, 3-6-5]

MST: [0-2, 2-4, 3-6, 5-6, 0-1]
```

Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



Removed edge: e=3-4

Cycle? isConnected(3, 4)

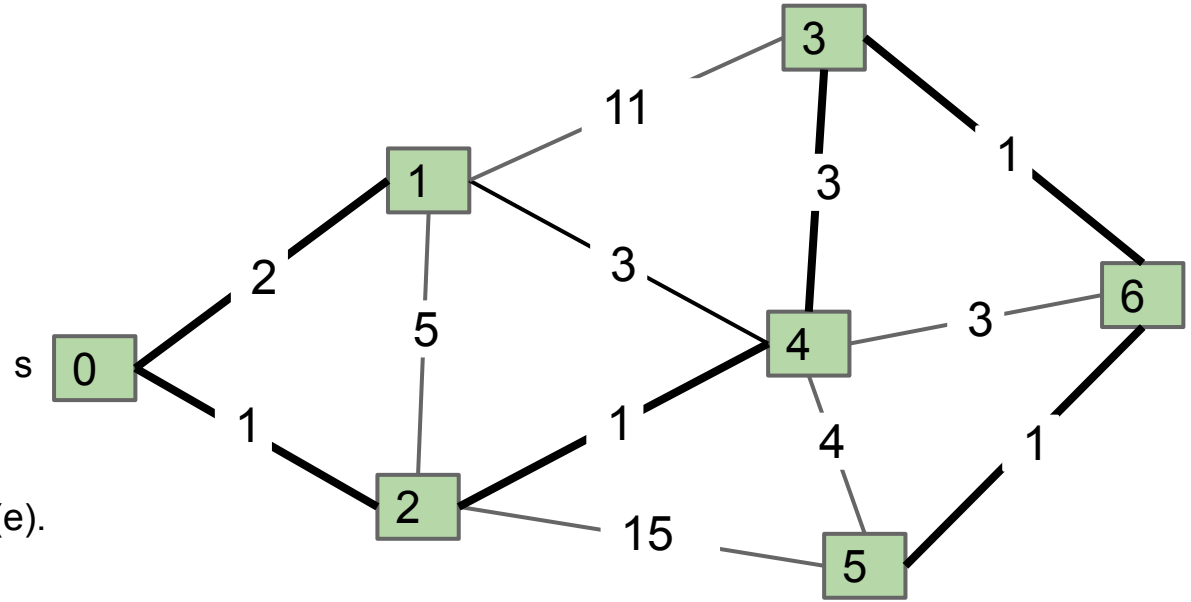
```
WQU: [0-2-4-1, 3-6-5]

MST: [0-2, 2-4, 3-6, 5-6, 0-1]
```

Kruskal's Demo

Insert all edges into PQ.

Repeat: Remove smallest weight edge. Add to MST if no cycle created.

```
Fringe: (6-4: 3),
(4-5: 4), (1-2: 5),
(1-3: 11), (2-5: 15)
```



Removed edge: e=3-4

Cycle? No. union(3, 4). add(e).

WQU: [0-2-4-1-3-6-5]

MST: [0-2, 2-4, 3-6, 5-6, 0-1, 3-4]

V-1 edges, so done.