HW 4
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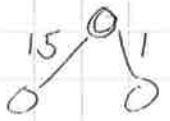
3/15

Task 6.1
True: Kruskal's alg reduces the problem to sorting, and we can sort negative numbers

Task 6.2
True: As above, sorting negated edge weights will provide the ~~same~~ reverse ordering

Task 6.3
False: by counter example

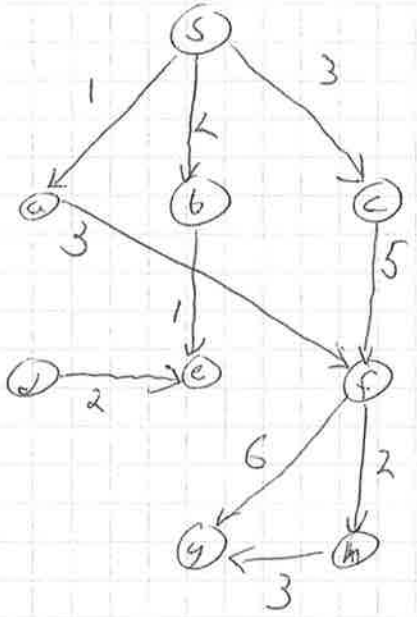


Task 7.1
A, B, C, X, H, M
A, B, M, X, H, C
A, B, M, H, X, C
A, M, X, H, B, C
A, M, H, X, B, C

Task 8.1
Both percolate_up & percolate_down have logarithmic runtime
The loop on lines 6-8 runs (n-1) times $\Rightarrow O(n \cdot \log n)$
The loop on lines 9-12 runs (n-3) times $\Rightarrow O(n \cdot \log n)$
Note swap is $O(1) \Rightarrow O(n)$ total

The asymptotic runtime of this alg is equal to
$O(\max\{n, n \log n, n \log n\}) \Rightarrow O(n \cdot \log n)$

Task 9.1



Time step	Visited so far	Priority Queue
0	—	(0, s)
1	(0, s)	(1, a) (2, b) (3, c)
2	(0, s) (1, a)	(2, b) (3, c) (4, f)
3	(0, s) (1, a) (2, b)	(3, c) (3, e) (4, f)
4	(0, s) (1, a) (2, b) (3, c)	(3, e) (4, f)
5	(0, s) (1, a) (2, b) (3, c) (3, e)	(4, f)
6	(0, s) (1, a) (2, b) (3, c) (3, e) (4, f)	(6, h) (10, g)
7	(0, s) (1, a) (2, b) (3, c) (3, e) (4, f) (6, h)	(9, g)
8	(0, s) (1, a) (2, b) (3, c) (3, e) (4, f) (6, h) (9, g)	—
9	"	—
10	"	—

Note node d is inaccessible from node s