

Name: Goh Wei Zhe

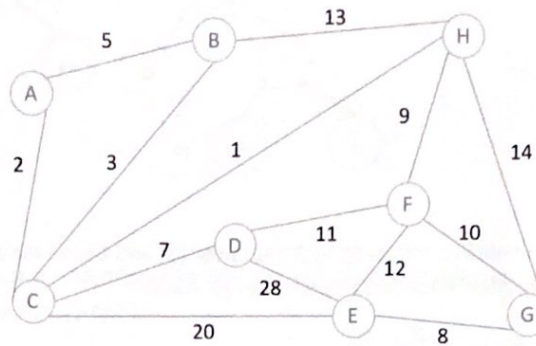
9.5 + 1 = 10.5

Total: 14 marks

1. Consider the following graph:

A	B	C	H	D	E	F	G
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A FT  
 B FT  
 C FT  
 D FT  
 E FT  
 F FT  
 G FT  
 H FT



a. List the order of nodes traversed using BFS starting from node A. [2 marks]

A, B, C, H, D, E, F, G

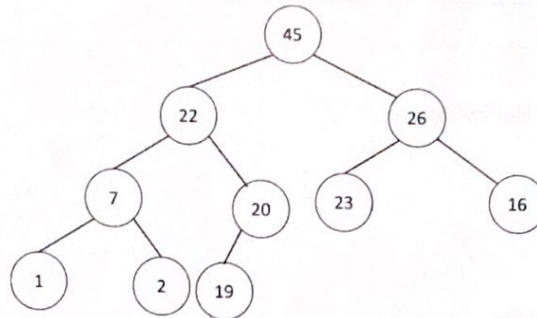
b. Represent the adjacency list representation of the graph. [2 marks]

A → [B | 5] → [C | 2] → ∅  
 B → [A | 5] → [H | 13] → ∅ → A  
 C → [B | 3] → [H | 1] → [D | 7] → [E | 20] → ∅  
 D → [C | 7] → [F | 11] → [E | 28] → ∅  
 E → [C | 20] → [D | 28] → [F | 12] → [G | 8] → ∅  
 F → [D | 11] → [E | 12] → [G | 10] → [H | 9] → ∅  
 G → [E | 8] → [F | 10] → [H | 14] → ∅  
 H → [B | 1] → [C | 1] → [F | 14] → ∅

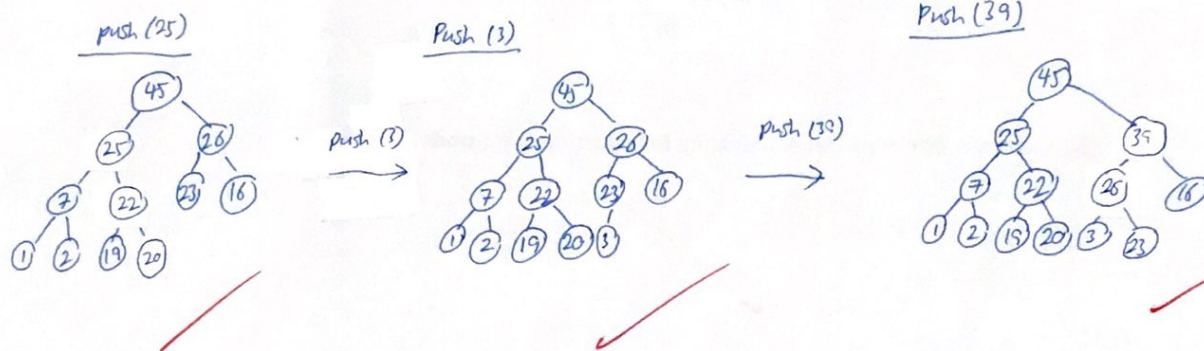
-0.5

3.5

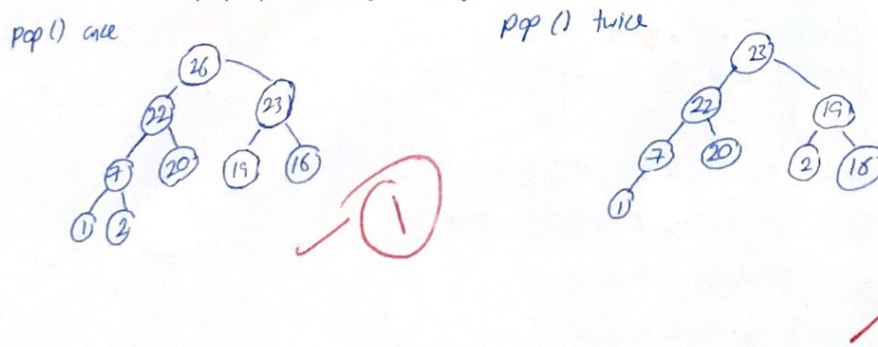
2. Given the following Max-Heap



a. Perform `Heap::push(25)`, followed by `Heap::push(3)` and then followed by `Heap::push(39)`. Show the resulting heap after each push operation. [3 marks]

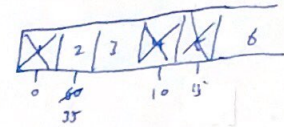
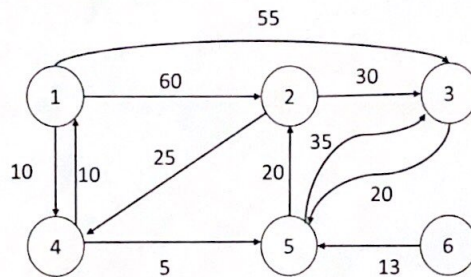


b. Perform TWO `Heap::pop()` operations. Show the resulting array representations of the heap after each pop operation. [2 marks]



3. Fill in the details for Dijkstra's Algorithm to find the shortest path from **vertex 1** to all the other nodes in the following graph. [5 marks]

$\text{adj}[1] = 2, 4$   
 $d[1] + c(1,2) < d[2]$   
 $d[1] + c(1,4) < d[4]$   
 $\text{adj}[4] = 1, 5$   
 $d[4] + c(4,1) < d[1]$   
 $d[4] + c(4,5) < d[5]$   
 $\text{adj}[5] = 2$   
 $d[5] + c(5,2) < d[2]$



Previous[2]	<del>N/A</del> 2 <del>X</del> 5
Previous[3]	<del>N/A</del> 3 <del>X</del> 1
Previous[4]	<del>N/A</del> 1 ✓
Previous[5]	<del>N/A</del> 4 ✓
Previous[6]	<del>N/A</del> 5 <del>X</del> N/A

Distance[2]	<del>90</del> <del>60</del> 35 ✓ 45
Distance[3]	<del>10</del> ✓ <del>X</del> 45
Distance[4]	<del>90</del> 10 ✓
Distance[5]	<del>90</del> 15 ✓
Distance[6]	<del>10</del> ✓

$d[2] = 4, 3$   
 $d[2] + c(2,4) < d[4]$