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This answer sheet is for the 4:30pm section only. Submitting to the wrong section will receive a zero.

Q1: Read the instructions for question Q1 in the question document. **For each of the three sub-questions, write your answer to the question in the given space**.

(a): After the extract-min operation, we have

A[2]= 90

A[3]= 93

A[5]= 95

A[6]= 94

A[12]= 97

(b): After the decrease-key operation, we have

A[1]= 85

A[2]= 88

A[3]= 93

A[5]= 89

A[10]= 90

(c): After the insertion operation, we have

A[1]= 80

A[2]= 89

A[3]= 88

A[6]= 93

A[13]= 94

Q2: Read the instructions for question Q2 in the question document. **For each of the three sub-questions, write your answer to the question in the given space**.

(a): After performing union(8, 16), we have

A[1]= -3

A[5]= 1

A[7]= 1

A[13]= 1

A[16]= 13

(b): After performing union(10, 14), we have

A[1]= -3

A[9]= 1

A[10]= 1

A[13]= 1

A[14]= 13

(c): After performing find-set(8) and find-set(10), we have

A[5]= 1

A[7]= 1

A[8]= 1

A[9]= 1

A[10]= 9

Q3: Read the instructions for question Q3 in the question document. **For each of the three sub-questions, write your answer to the question in the given space**.

(a): After the DFS on G, the discovery times for vertices $3, 5, 7$ are

$3.dsc=$ 3

$5.dsc=$ 6

$7.dsc=$ 12

(b): After the DFS on G, the finish times for vertices $2, 4, 6$ are

$2.fin=$ 9

$4.fin=$ 8

$6.fin=$ 16

(c): After the DFS on G, th predecessors for vertices $2, 3, 6$ are

$2.\pi$= 1

$3.\pi$= 2

$6.\pi$= nil

Q4: Read the instructions for question Q4 in the question document. **For each of the two sub-questions, write your answer to the question in the given space**.

(a): After the BFS on G, the distances of vertices $2, 3, 4$ from vertex 1 are

$2.d$= 1

$3.d$= 2

$4.d$= 1

(b): After the BFS on G, the predecessors of vertices $5, 6, 7$ are

$5.\pi$= 1

$6.\pi$= 3

$7.\pi$= 8

Q5: Read the instructions for question Q5 in the question document. **For each of the two sub-questions (each with 10 entries), answer the question by entering the values into the corresponding boxes**.

(a): **Immediately before** vertex 3 is deleted from the priority queue, we have

$1.d =$ 2

$1.\pi =$ 2

$2.d =$ 1

$2.\pi =$ 1

$3.d =$ 0

$3.\pi =$ 0

$6.d =$ 1

$6.\pi =$ 3

$7.d =$ 2

$7.\pi =$ 7

(b): **Immediately before** vertex 5 is deleted from the priority queue, we have

$1.d =$ 1

$1.\pi =$ 4

$2.d =$ 2

$2.\pi =$ 1

$3.d =$ 1

$3.\pi =$ 2

$6.d =$ 2

$6.\pi =$ 3

$7.d =$ 2

$7.\pi =$ 6

Q6: Read the instructions for question Q6 in the question document. **For each of the two sub-questions (each with 10 entries), answer the question by entering the values into the corresponding boxes**.

(a): **Immediately before** vertex 1 is deleted from the priority queue, we have

$2.key =$ 6

$2.\pi =$ 4

$3.key =$ 7

$3.\pi =$ 2

$6.key =$ nil

$6.\pi =$ nil

$7.key =$ nil

$7.\pi =$ nil

$8.key =$ nil

$8.\pi =$ nil

(b): **Immediately before** vertex 8 is deleted from the priority queue, we have

$2.key =$ 6

$2.\pi =$ 4

$3.key =$ 7

$3.\pi =$ 2

$6.key =$ 14

$6.\pi =$ 3

$7.key =$ 17

$7.\pi =$ 8

$8.key =$ 14

$8.\pi =$ 5