First Name: Last Name:

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

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

   A[1]=

   A[2]=

   A[3]=

   A[5]=

   A[10]=

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

   A[1]=

   A[2]=

   A[3]=

   A[5]=

   A[10]=

(c):   After the insertion operation, we have

A[1]=

A[2]=

A[3]=

A[5]=

A[11]=

Q2: Read the instructions for question Q2 in the assignment 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[1]=

A[2]=

A[3]=

A[4]=

A[8]=

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

A[1]=

A[2]=

A[3]=

A[4]=

A[9]=

(c):   After the insertion operation, we have

A[1]=

A[2]=

A[3]=

A[5]=

A[11]=

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

(a):   After performing union(16, 4), we have

A[1]=

A[4]=

A[9]=

A[15]=

A[16]=

(b):   After performing union(6, 14), we have

A[1]=

A[6]=

A[9]=

A[14]=

A[15]=

(c):   After performing find-set(7) and find-set(15), we have

A[1]=

A[7]=

A[8]=

A[9]=

A[15]=

Q4: Read the instructions for question Q4 in the question document. **For each of the eight sub-questions, check the box that most accurately describes the corresponding time complexity**.

(a): $O(\log n)$

$\Omega(\log n)$

$\Theta(\log n)$

$O(n)$

$\Omega(n)$

$\Theta(n)$

$O(n \log n)$

$\Omega(n \log n)$

$\Theta(n \log n)$

None of the above

(b): $O(\log n)$

          $\Omega(\log n)$

          $\Theta(\log n)$

          $O(n)$

          $\Omega(n)$

          $\Theta(n)$

          $O(n \log n)$

          $\Omega(n \log n)$

          $\Theta(n \log n)$

          $\Theta(1)$

(c): $O(\log n)$

          $\Omega(\log n)$

          $\Theta(\log n)$

          $O(n)$

          $\Omega(n)$

          $\Theta(n)$

          $O(n \log n)$

          $\Omega(n \log n)$

          $\Theta(n \log n)$

          $\Theta(1)$

(d): $O(\log n)$

$\Omega(\log n)$

$\Theta(\log n)$

$O(n)$

$\Omega(n)$

$\Theta(n)$

$O(n \log n)$

$\Omega(n \log n)$

$\Theta(n \log n)$

$\Theta(1)$

(e): $O(\log n)$

$\Omega(\log n)$

$\Theta(\log n)$

$O(n)$

$\Omega(n)$

$\Theta(n)$

$O(n \log n)$

$\Omega(n \log n)$

$\Theta(n \log n)$

$\Theta(1)$

(f): $O(\log n)$

$\Omega(\log n)$

$\Theta(\log n)$

$O(n)$

$\Omega(n)$

$\Theta(n)$

$O(n \log n)$

$\Omega(n \log n)$

$\Theta(n \log n)$

$\Theta(1)$

(g): $O(\log n)$

$\Omega(\log n)$

$\Theta(\log n)$

$O(n)$

$\Omega(n)$

$\Theta(n)$

$O(n \log n)$

$\Omega(n \log n)$

$\Theta(n \log n)$

$\Theta(1)$

(h): $O(m)$

$\Omega(m)$

$\Theta(m)$

$O(m \log n)$

$\Omega(m \log n)$

$\Theta(m \log n)$

$O(m\alpha(m,n))$, where $\alpha(m,n)$ is the inverse Ackermann function.