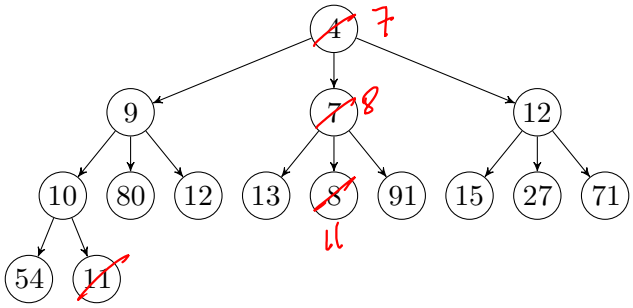
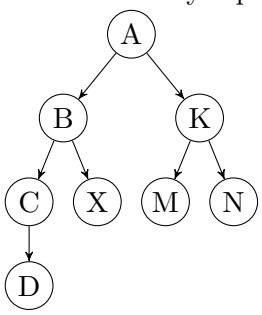
## CSE 373 Lecture 17 Worksheet

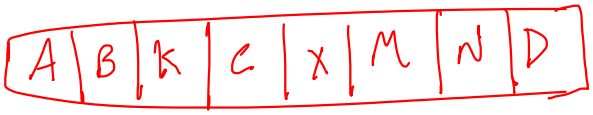
**Name & UW NetID:**

1. Draw the resulting min-heap after a `removeMin()` call to the following min-heap.




2. Write the array representation of the following min-heap.




0 1 2 3 4 5 6 7 8 9 10 11 12 13

3. If the sequence [1, 5, 18, 22, 31, 32, 36, 43, 46, 55, 56, 57, 83, 88] represents a min-heap in an array, answer the following:
   (a) what is the right child of 22: 46
   (b) what is the left child of 32: 57
   (c) what is the parent of 55: 31
   (d) what is the left child of 43: —

$R(i) = 2i + 2$
$L(i) = 2i + 1$
$P(i) = \frac{i-1}{2}$

4. Consider three sorting algorithms.
   - Algo A: requires only 1 additional memory location to store a temp variable,
   - Algo B: requires 100 additional memory locations as its axillary storage, and
   - Algo C: requires additional memory that is equivalent to $(1/100)^{th}$ times the input size $n$.

   Which of the following statements are true? (select all that apply):
   A. Algo A is an in-place and stable sorting algorithm
   B. Algo B is an in-place sorting algorithm
   C. Algo C is an in-place

5. Consider the following four sorting algorithms and their properties.

   - Algo A: Worst-case $O(n^2)$, average-case $O(n \log n)$, space: $O(1)$ stable, not in-place.
   - Algo B: Worst-case $O(n \log n)$, average-case $O(n \log n)$, not-stable, in-place.
   - Algo C: Worst-case $O(n^2)$, average-case $O(n^2)$, stable, in-place.
   - Algo D: Worst-case $O(n^2)$, average-case $O(n \log n)$, not-stable, not in-place.

   Given the same input to all these four algorithms, output of _____algorithms would be the same. (select all that apply from the choices below)

   A. A, B, C, and D (all are sorting algorithms after all!)

   B. B, C

   C. A, D

   D. A, C

   E. Other