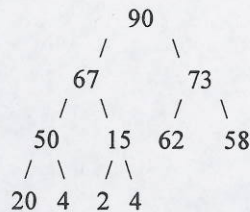
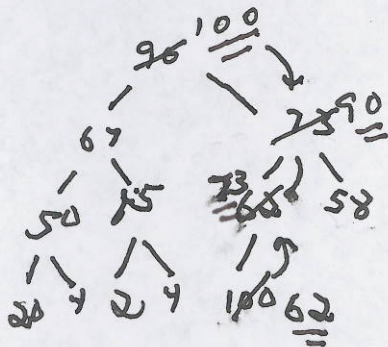


**Heaps (10 points)**

4. Consider the heap given below:

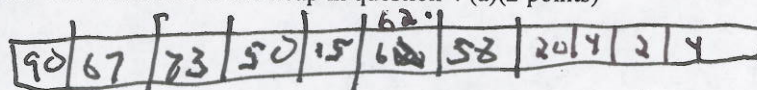


(a) Show the series of steps that would take place in adding a node containing 100 to the heap given above. In your answer, you should show what the heap looks like after each step in the addition process or reheapification process so that it is clear to the reader how the changes were made. (4 points)



Key

(b) Draw the heap in question 4 in an array. Be sure to show the array indexes. (Draw the heap before the 100 was added to the heap in question 4 (a)(2 points)



(c) Consider again the heap in question 4 a. (without the 100). Describe a best case insertion into this heap. In other words, describe a value that you would add to this queue that would produce a best case insertion and specify the big  $\theta$  performance of this insertion. (2 points)

$$x < 62 \text{ in } \Theta(1)$$