Assignment 4

3   a) $O(n^2)$ b) same for all cases $O(n^2)$

     c) No, because we don't have break points
        we need to compare all values in the array

5.   Let $C(n)$ be the number of comparisons we
        need to sort an integer array using sort R,
           placeLargest and placeSmallest have the same
        complexity for the same size of n (end-start+1)
              Let $D(n)$ be the number of comparisons to place the
        smallest/largest value at the left/right position
                        $D(n) = n-1$

        $C(0) = 0$
        $C(1) = 0$
        $C(2) = D(2) + D(1) + C(0) = 1+0+0 = 1$
        $C(3) = D(3) + D(2) + C(1) = 2+1+0 = 3$ $2(n-4)-3$
        $C(4) = D(4) + D(3) + C(2) = 3+2+1 = 6.$ $2n-11$
        $C(5) = D(5) + D(4) + C(3) = 4+3+3 = 10$
        $C(6) = D(6) + D(5) + C(4) = 5+4+6 = 15$

        $C(n) = C(n-1) + (n-1)$
              $= (n-1) + (n-2) + C(n-2)$
              $= (n-1) + (n-2) + (n-3) + (n-4) + \qquad 3+2+1$
              $= \sum_{i=1}^{n-1} i = \frac{(n-1)(n-2)}{2} = \frac{1}{2}n^2 - \frac{3}{2}n + 1 \quad \Rightarrow O(n)$

6.   a) there is no worst/best/average case because we don't exit the
          program until all value are sorted

       b) No, same reason as above.