1. (9 points) Order the following functions by growth rate. No explanation is necessary.
   \( n, \sqrt{n}, n^{1.5}, n^2, n \log n, n \log \log n, n (\log n)^2, n^2 \log n, n^3 \).

2. For each of the following program fragments, give an analysis of the running time. You may use summations to evaluate the running times of nested loops.

   (a) (2 points)
   ```
   sum = 0
   for i = 1 to n
       for j = 1 to n * n
           sum ++
   ```

   (b) (2 points)
   ```
   sum = 0
   for i = 1 to n
       for j = 1 to i
           sum ++
   ```

   (c) (3 points)
   ```
   sum = 0
   for i = 1 to n
       for j = 1 to i * i
           for k = 1 to j
               sum ++
   ```

   (d) (4 points)
   ```
   sum = 0
   for i = 1 to n
       for j = 1 to i * i
           if j mod i == 0
               for k = 1 to j
                   sum ++
   ```