1. Reorder the following efficiencies from the smallest to the largest:
   a. $2^n$
   b. $n!$
   c. $n^5$
   d. 15,000
   e. $n\log_2(n)$

2. Reorder the following efficiencies from the smallest to the largest:
   a. $n\log_2(n)$
   b. $n + n^4 + n^3$
   c. $10^5$
   d. $n^{0.5}$

3. Determine the big-O notation for the following:
   a. $5n^{5/2} + 11n^{25}$
   b. $9\log_2(n) + 6n$
   c. $3n^4 + 8\log_2(n)$
   d. $5n^2 + n^{3/2} + 3n^{3/3}$

4. Calculate the run-time efficiency of the following program segment:
   ```plaintext
   1 i = 1
   2 loop (i <= n)
     1 print (i)
     2 i = i + 1
   3 end loop
   ```

5. Calculate the run-time efficiency of the following program segment:
   ```plaintext
   1 i = 1
   2 loop (i <= n)
     1 j = 1
     2 loop (j <= n)
       1 k = 1
       2 loop (k <= n)
         1 print(i, j, k)
         2 k = k + 1
       3 end loop
     4 j = j + 1
     3 end loop
   4 i = i + 1
   3 end loop
   ```

6. If the algorithm `doIt` has an efficiency factor of $7n$, calculate the run time efficiency of the following program segment.
   ```plaintext
   1 i = 1
   2 loop (i <= n)
     1 doIt(...)
     2 i = i + 1
   3 end loop
   ```

7. If the efficiency of the algorithm doIt can be expressed as $O(n) = n^2$, calculate the efficiency of the following program segment.
1 i = 1
2 loop (i <= n)
 1 j = 1
 2 loop (j < n)
    1 doIt(...)
    2 j = j + 1
 3 end loop
4 i = i + 1
3 end loop

8. If the efficiency of the algorithm doIt can be expressed as $O(n) = n^2$, calculate the efficiency of the following program segment.

1 i = 1
2 loop (i < n)
 1 doIt(...)
 2 i = i * 2
3 end loop

9. Given that the efficiency of an algorithm is $5n^2$, if a step in this algorithm takes 1 nanosecond ($10^{-9}$), how long does it take the algorithm to process an input of size 10000?

10. Given that the efficiency of an algorithm is $3n^3$, if a step in this algorithm takes 1 nanosecond ($10^{-9}$), how long does it take the algorithm to process an input of size 10000?

11. Given that the efficiency of an algorithm is $3n\log_2(n)$, if a step in this algorithm takes 1 nanosecond ($10^{-9}$), how long does it take the algorithm to process an input of size 8000?