

Sheet1

Question 1 Reorder the following efficiencies from smallest to largest:

- a. $2n$
 - b. $n!$
 - c. n^5
 - d. 10,000
 - e. $n\log(n)$
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Question 2 Reorder the following efficiencies from smallest to largest:

- a) 2^n
 - b) $0.05n!$
 - c) $3 + n^2 + n^5$
 - d) 50000
 - e) $n\log 2n$
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Problem 3 Decide whether these statements are True or False.

- a. If $O(f(n)) = O(g(n))$ then $f(n) = g(n)$
 - b. If $f(n) = O(g(n))$ and $g(n) = O(f(n))$ then $f(n) = g(n)$
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Problem 4 Calculate the run-time efficiency of the following program

```
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
```

Problem 5 If the algorithm `doIt` has an efficiency factor of $5n$, calculate the run-time efficiency of the following program

```
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
```
