

Problem Set 1

1)

Suppose an algorithm takes 5 seconds when the input size is 20,000. How long does it take if the input size is 100,000 under each of the following conditions:

The algorithm is linear.

The algorithm is logarithmic

The algorithm is cubic.

The algorithm is $n \log n$.

The algorithm is quadratic.

The algorithm takes constant time.

2)

Consider the following C code:

```
for(i = 0; i <= n; i += 2)
  for(j = i; j < n; j++)
    foo(j);
```

Assume that $\text{foo}(m)$ is a function of $_ (m)$ complexity.

How many times is $\text{foo}()$ invoked if $n = 100$?

Circle the statements below which correctly describe the code's complexity.

$O(n^6)$

$\Omega(n^6)$

$\Theta(n^6)$

$O(n^3)$

$\Omega(n^3)$

$\Theta(n^3)$

$O(n^2)$

$\Omega(n^2)$

$\Theta(n^2)$

$O(n \log n)$

$\Omega(n \log n)$

$\Theta(n \log n)$