CSC 212 Tutorial #2 Solution
Performance Analysis

Problem 1

Line	Frequency
1	1
2	6
3	5
4	1
Total	13
O	1

Line	Frequency
1	1
2	$\frac{n}{2} + 1$
3	$7(\frac{n}{2})$
4	$6(\frac{n}{2})$
5	1
Total	$7n + 3$
O	n

Line	Frequency
1	1
2	n+1
3	$\frac{n(n+1)}{2} + n$
4	$\frac{n(n+1)}{2}$
5	1

Total	$n^2 + 3n + 3$
O	n^2

```
// O(n)
int sum = 0;
for (int i = 1; i <= n; i++)
    sum = sum + i;

// O(1)
return n * (n + 1) / 2
```

Line	Frequency
1	1
2	$n + 1$
3	$n(logn + 2)$
4	$n(logn + 1)$
5	1

Total	$2nlogn+4n+3$
O	$nlogn$

Problem 2

$f(n) \leq cg(n), \forall n \geq n_0$

$$\begin{aligned} 5n^3logn + 20n^2 - 4n + 3 &\leq 5n^3logn + 20n^3logn + 3n^3logn \\ &\leq 28n^3logn \end{aligned}$$

$g(n) = n^3logn, c = 28, n_0 = 2$

Problem 3

$$= 2^{4logn} * 2^2 + n^3 logn$$
$$= 4n^4 + n^3 logn$$
$$O(n^4)$$