CSE332 Week 2 Section Worksheet

1. Find values for c and n_0 (according to the definition of O( )) for f(n) is O(g(n)), where

a. f(n)=7n, g(n)=n/10

b. f(n)=1000, $g(n)=3n^3$

c. $f(n)=7n^2+3n$, $g(n)=n^4$

d. f(n)=n+2nlogn, g(n)=nlogn

2. True or false?

a. f(n) is Θ(g(n)) implies f(n) is O(g(n))

b. f(n) is Θ(g(n)) implies g(n) is Θ(f(n))

c. f(n) is Ω(g(n)) implies f(n) is O(g(n))

3. Find functions f(n) and g(n) such that f(n) is O(g(n)) and the constant c for the definition of O( ) must be >1. That is, find f & g such that c must be greater than 1, as there is no sufficient n_0 when c=1.

4. Write the O( ) run-time of the functions with the following recurrence relations

a. T(n)=3+T(n-1), where T(0)=1

b. T(n)=3+T(n/2) , where T(1)=1

c. T(n)=3+T(n-1)+T(n-1) , where T(0)=1

5. Prove by induction that $\sum_{i=0}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$

6. What's the O( ) run-time of this code fragment in terms of n:

a.
```
int x=0;
for(int i=n;i>=0;i--)
     if((i%3)==0) break;
     else x+=n;
```

b.
```
int x=0;
for(int i=0;i<n;i++)
     for(int j=0; j<(n*n/3); j++)
          x+=j;
```

c.
```
int x=0;
for(int i=0;i<=n;i++)
     for(int j=0; j<(i*i); j++)
          x+=j;
```