CSC 130
Homework 1

1. For the table below, compare pairs of functions f(n) (rows) and g(n) (columns). For each cell, fill in the tightest and strongest true relationship between f and g:

$O$ if $f(n)$ is $O(g(n))$
$\Omega$ if $f(n)$ is $\Omega(g(n))$
$\Theta$ if $f(n)$ is $\Theta(g(n))$
– if none of the above.

If there is a * in the box, then also give a short explanation of why that relationship holds.

| | 5 | $n^2+3$ | $n\log n^5$ | $5^n$ |
|---|---|---|---|---|
| $n^2$ | | | | |
| $\log n$ | | | | |
| 100 | | | | |

2. True or False:
   a. $f(n)$ is $\Theta(g(n))$ implies $f(n)$ is $O(g(n))$
   b. $f(n)$ is $\Theta(g(n))$ implies $g(n)$ is $\Theta(f(n))$
   c. $f(n)$ is $\Omega(g(n))$ implies $f(n)$ is $O(g(n))$

3. What's the O() – Big "Oh" runtime of the 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;
```