Discrete Math, Homework 3, Chapter 3

1. (1 point) We often uses pseudocode to state an algorithm because:
a. It can be more complex to state it in an actual programming language.
b. To state it in an actual programming language would favor users of that language over other students.
c. We can express the ideas of the algorithm more clearly in pseudocode.
*d. All of the above.

2. (1 point) If f(x) = 148x, then f(x) is (*not restricting* ourselves to the tightest bound):
a. O(x)
b. O(x^2)
c. O(x^4)
*d. All of the above.

3. (1 point) If f(x) = 148x, then f(x) is (*restricting* ourselves to the tightest bound):
*a. O(x)
b. O(x^2)
c. O(x^4)
d. All of the above.

4. (1 point) Which of the following functions grows the most slowly?
a. f(x) = x log x
b. f(x) = 7x
c. f(x) = lg x
*d. f(x) = sin x

5. (1 point) Which of the following functions have the same big-O tight bound?
a. f(x) = 10x^2 and f(x) = 10x
b. f(x) = x^3 and f(x) = 100x^2
*c. f(x) = 1x and f(x) = 1000000x + 1000000
d. f(x) = 1000x and f(x) = x lg x

6. (1 point) What is the big-O of f(x) = x^2 * log x + x^2.2
a. x^2
b. x^2 log x
*c. x^2.2
d. All of the above.

7. (1 point) Consider the following function: what is its (tight bound) big-O run time?

```
f(n):
    for i from 1 to n:
        for j from 1 to n:
            print i * j
            j = floor(j / 2)
        i = i + 1
```

a. n^2
*b. n log n
c. n
d. n / 2

8. (1 point) While big-O gives an upper bound for an algorithm's run-time complexity, if we want the lower bound, we use:
a. big-O also
*b. big-Omega
c. big-Theta
d. little-O

9. (1 point) Determine the complexity of the function below:

```
  SUM(s)
  s = 0
  for i = 1 to n
       s = s + i
  return s
```

*a. O(n)
b. O(n^2)
c. O(n log n)
d. O(e^n)

10. (1 point) What is the Big-O runtime of the above function:

```
duplicates(A)
 for i = 1 to A.length
    for j = i + 1 to A.length
        if A[i] == A[j]
          print(A[i])
```

a. O(n)
*b. O(n^2)
c. O(nlogn)
d. O(n^2logn)

11. (1 point) What k could we choose as witness to make f = O(g), if f(x) = x^2.00001 and g(x) = x^2?
a. 3
*b. no such k exists
c. 42
d. 2.00001

12. (1 point) After what C will g rise above f, if g(x) = x^3 and f(x) = 89x^2?
a. 3
b. 2
c. 89
d. no such C exists