Quiz 2

CS 241—Data Structures—Fritz Ruehr

Name: _____

1. If one algorithm runs in time O(n log n) and the other in O(log n), which one is "faster"?

   _____

2. Johnny got a brand new PC from his parents after he dropped the last one in the mill stream while goofing around with his friends. He kept all his old apps because he wanted to maintain version compatibility, but he says they all run a lot faster with his sweet new box. Which of the following is true (include *all* that apply):

   (a) *some* of Johnny's apps run in better O-notation time due to the new hardware

   (b) *all* of Johnny's apps run in better O-notation time due to the new hardware

   (c) the O-notation running time of Johnny's apps is *not affected* by the new hardware

   (d) Johnny ought to be more careful with expensive equipment around water

   _____

3. What is the base-10 logarithm of a number n, *approximately,* given its representation as a base-10 numeral?

   _____

4. True or False: if algorithm A runs in time O(n) and algorithm B runs in time O(n^2), then algorithm A will *always* run faster than algorithm B.

   _____

5. Here are two short loops in Java: if the time taken by the arithmetic in the inner loop runs in constant time (O(1)), what's the running time of the whole loop, in O-notation?

```
for (int i=0; i<n; i++) {
   for (int j=0; j<n*n; j++) {
      x = x+i-j;
   }
}
```

   _____

6. *(see above):*

```
for (int i=0; i<n; i++) {
   for (int j=i; j>0; j--) {
      x = x+i*j/2;
   }
}
```

   _____