CMP167 – Quiz #10

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Name: _____

Results: _____

Class: _____

Date: _____

1. Linear search requires a number of steps proportional to the size of the list being searched.
   a. True
   b. False

2. All proper recursive definition must have exactly one non recursive base case.
   a. True
   b. False
   It must have *at least* one

3. Merge sort is an example of an n log n algorithm.
   a. True
   b. False

4. Exponential algorithms are general considered intractable.
   a. True
   b. False

5. Approximately how many iterations will it take binary search to search a list of 512 items?
   9
   $\log_2(512)=9$

In class we considered a recursive method of solving the Fibonacci sequence. This, however, is normally intractable. Write the algorithm and explain why it is intractable. For extra credit, modify the program to improve it.

```
def fib(n):
    if n < 3:
        return 1
    else:
        return fib(n-1) + fib(n-2)
```

The problem is that values must be re-computed many times. This can be solved by writing hte program iteratively such as follows:

```
def fib_iterative(n):
    a, b = 1,1
    for i in range(n-1):
        a,b = a+b, a
    return b
```

or through dynamic programming

```
cache = {}
def fib_dynamic_programming(n):
    if n in cache:
        return cache[n]
    else:
        if n < 3:
            return 1
        else:
            cache[n] = fib_dynamic_programming(n-1) + fib_dynamic_programming(n-2)
            return cache[n]
```