University of Nevada, Las Vegas Computer Science 302 Spring 2017

Assignment 2, Problem 1: Due 8:00 AM, February 6, 2016

Name:_____

You are permitted to work in groups, get help from others, read books, and use the internet. But the handwriting on this document must be your own. You may attach extra sheets, using a stapler.

1. Find the asymptotic time complexity of each of the following code fragments. Each answer is one of the following: n, $\log\log n$, $\log n$, $\log^2 n$, $\sqrt{n}$, $n \log n$, $n^{\frac{3}{2}}$. Do not turn in any code for this problem.

   (a)
   ```
   for (i = n; i > 1; i = i/2)
   ```

   (b)
   ```
   for (i = 1; i < n; i++)
     for (j = 1; j < i; j = 2*j)
   ```

   (c)
   ```
   for (i = 1; i*i < n; i++)
   ```

   (d)
   ```
   for (i = 2; i < n; i = i*i)
   ```

   (e)
   ```
   for (i = 1; i < n; i = 2*i)
     for (j = 1; j < i; j = 2*j)
   ```

   (f)
   ```
   for (i = 0; i < n; i++)
     for (j = 0; j < i*i; j++)
   ```

   (g)
   ```
   for (i = 1; i < n; i++)
     for (j = i; j < n; j = 2*j)
   ```

For each of the following functions, determine the number of lines of output of $f(n)$ is executed. The only possible answers are $O(\log n)$, $O(n)$, $O(n \log n)$, and $O(n^2)$.

(h)
```
void f(int n)
  if (n > 1){
    cout << Hi there << endl;
    f(n/2);
  }
```

(i)
```
void f(int n){
  for(int i=1;i < n;i++)
    cout << Hi there << endl;
  if (n > 1)
    f(n/2);
  }
```

(j)
```
void f(int n){
  for(int i=1;i < n;i++)
    cout << Hi there << endl;
  if (n > 1){
    f(n/2);
    f(n/2);
  }
  }
```

(k)
```
void f(int n){
  cout << Hi there << endl;
  if (n > 1)
    f(n-1);
  }
```

(l)
```
void f(int n){
  for(int i=1;i < n;i++)
    cout << Hi there << endl;
  if (n > 1)
    f(n-1);
  }
```

(m)
```
void f(int n){
  for(int i=1;i < n;i++)
    cout << Hi there << endl;
  if (n > 1){
    f(n/2);
    f(n/2);
    f(n/2);
    f(n/2);
  }
  }
```