

1. What is the running time of each of the code fragments? Give your answers in *Big-O* notation.

```
/******  
  
for (i = 1; i <= n; i += 2)  
    k++;  
  
/******  
  
for (i = 1; i <= n; i *= 2)  
    k++;  
  
/******  
  
for (i = n; i >= 1; i /= 20){  
    j = m;  
    while (j >= 1)  
        j -= 20;  
}  
  
/******  
  
i = 0;  
while (i < n * n * n)  
    i = i + (2 * n);  
  
/******
```

2. Write a recurrence equation for the following function and solve it using the repeated substitution method?

```
int factorial(int n){  
    if (n <= 1)  
        return 1;  
    return n * factorial(n - 1);  
}
```

3. Write a recurrence equation for the following function and solve it using the repeated substitution method?

```
void hanoi (int n, char source, char dest, char space){  
    if (n > 0){  
        hanoi(n-1, source, spare, dest);  
        hanoi(n-1, spare, dest, source);  
    }  
}
```

4. Write a recurrence equation for the following function and solve it using the repeated substitution method?  
Consider the WORST CASE.

```
int binarySearch(int A[ ], int key, int low, int high){  
    if (low > high)  
        return -1;  
    int mid = (low + high) / 2;  
    if (A[mid] == key)  
        return mid;  
    if (A[mid] > key)  
        return binarySearch(A, key, low, mid - 1);  
    return binarySearch(A, key, mid + 1, high);  
}
```

5. Write a recurrence equation for the following function and solve it using the repeated substitution method?

```
void foo(int n){  
    if (n > 1){  
        foo(n / 2);  
        foo(n / 2);  
    }  
}
```

6. Write a recurrence equation for the following function and solve it using the repeated substitution method?

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