**Assignment #2**

Determine ϴ for the following code fragments in the average case. Assume that all variables are of type ***int*.**

(a) **a = b + c;**

**d = a + e;**

**ANS =** ϴ(1) as these statements take constant time

(b) **sum = 0;**

**for (i=0; i<3; i++)**

**for (j=0; j<n; j++)**

**sum++;**

**ANS =** ϴ(n) as inner loops runs n times for 3 repetitions

(c) **sum=0;**

**for (i=0; i<n\*n; i++)**

**sum++;**

**ANS =** ϴ(n^2) as I loop runs n^2 times

(d) **for (i=0; i < n-1; i++)**

**for (j=i+1; j < n; j++) {**

**tmp = A[i][j];**

**A[i][j] = A[j][i];**

**A[j][i] = tmp;**

**}**

**ANS =** ϴ(n^2) as j loop runs n(n-1)/2 and outer i loop runs n times

(e) **sum = 0;**

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

**for (j=1; j<=n; j\*=2)**

**sum++;**

**ANS = ϴ(nlog(n)) as j runs nlogn times each time therefore nlogn times**

(f) **sum = 0;**

**for (i=1; i<=n; i\*=2)**

**for (j=1; j<=n; j++)**

**sum++;**

**ANS = ϴ(nlog(n)) I loop runs nlogn times and j loop runs nlogn times**

(g) Assume that array A contains n values, **Random** takes constant time, and **sort** takes n log n steps.

**for (i=0; i<n; i++) {**

**for (j=0; j<n; j++)**

**A[i] = Random(n);**

**sort(A, n); }**

**ANS = ϴ(n^2log(n)) sort algorithm runs nlogn times and i and j loops runs n times**