**Assignment Four**

**Question 1**

P(A) =¼

P(B) =¼

P(C) =¼

P(D) =¼

(a) The average number of array locations to find the first D = 1/p = 1/(¼) = 4 (Reference page 13)

(b) The average number of array locations to inspect to find 10 D’s = k/p = 10/(¼)= 40 (Reference page 15)

(c) Average time complexity = O(1)

**Question 2**

Based on the hint given for n=7

1+1/2 +1/3+1/4+1/5+1/6+1/7= log 7

For n=15

1+1/2+1/3+1/3….+1/15<= 1+1/2+1/2+(1/4)^4+(1/8)^8+(1/16)^16=4=log 16

=>log 15+1

Let n=31

1+1/2+1/3+1/4+1/5+…+1/31 = 1+1/2+1/2+(1/4)^4+(1/8)^8+(1/16)^16+(1/32)^32=5=log 32

Log 31+1

For any n,

1+1/2+1/3+1/4+…+1/n= log n+1 = O(log n).

**Question 3**

S = 1/2 + 2/4 + 3/8 + 4/16 + 5/32 + …

S/2 = 1/4 + 2/8 + 3/16 + 4/32 + …

S – S/2 = 1/2 + 1/4 + 1/8 + 1/16 + 1/32 +… ( Geometric Series)

=> S= a/(1-r)

S - S/2 = (½)/(1-½)

S(1-½)=(1/2)/(1/2)

S(½)=1

=> S=2