Lab W1D4 Solutions

Q1.

A. probability A =1/4 B= 1/4 C=1/4 D=1/4

So, Number of Array locations to get D is 1/p= 1/1/4= 4/1= 4

The formula is found on slide # 13 Result 1

1. B

K=10

P=1/4

Number of Attempts =k/p => 10/1/4 => 10\*4 = 40;

The formula is found on slide # 15 Result 2

C. The average time complexity to find k D’s is O(1);

Q2. Solution

Prove 1+1/2+1/3+1/4 +…+1/n= O(log n)

Let 1+1/2+ 1/3 …+1/n be f(n) and log n = g(n)

f(n) is O(g(n))

1+1/2+1/3+1/4+…+1/n<=log n

Let n=7;

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

1+1/2+1/3+1/4+1/5+1/6+1/7<= 1+1/2+1/2+1/4+1/4+1/4+1/4=3 =Log 8

* Log7+1

Let n=15

1+1/2+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

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

1+1/2+1/3+…+1/n<= log n

So, O(log n).

Q3. Solution

Find sum :1/2+2/4+3/8+4/16+5/32…..

S = 1/2+2/4+3/8+4/16+5/32+…..

Let’s divide s by 2

S/2= 1/4+2/8+3/16+ 4/32+…

S-S/2= 1/2+1/4+1/8+1/16+1/32+…

= 1/2(1-1/2^n)/1-1/2

S/2=1 as power becomes bigger and bigger the value becomes an to infinity;

s=2;

sum is 2;