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Lab W1D4 Solutions

1.

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

n n n

B. E(Z)= ∑i.pr(Z=i) => i∑1/n => 1/n∑ 1/n

i=0 i=0 i=0

=> 1/n(n(n+1)/2)

=> (n+1)/2

=> (100+1)/2

=> 50.5

C .

P(D) => ¼ and number of Array locations 1/p = 1/1/4 => 4

E(Z)= (n+1)/2 => (10000+1)/2 =10001/2=5000.5

D.

Average time complexity is O(1);

Q2.Solutions

A.

K=10

P=1/4

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

B.

Number of attempts => k/p=4k;

C.

Average time complexity O(1);

Q3.Solution

Prove 1+1/2+1/3+1/4 +…+1/n= O(log n)

Let 1+1/2+ 1/3+ ¼+ …+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+1/3….+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).

Q4.Solution

Find sum ½+1/3+1/4+1/4…..

Let s=1/2+1/3+1/4+1/5+…

Let’s divide s by 2

s/2= ¼+2/8+3/16+ 4/32+…

s-s/2= ½+1/4+1/8+1/16+1/32+…

s/2= ∑(1/2)^n = (½)/(1-1/2)

s/2=1 as n approaches to infinity ;

s=2;

sum is 2;