**Question 1.**

1. P(D) = 1/4

Expected no. of success = 1/p= 1/(1/4) = 4 success

Ref. slide 16, Lesson 3 Probability

(b) Average no. of array location to inspect 10 D = 4 success x 10 = 40

(c) the average time complexity of finding one of k D an array with 100000000000 elements will be O(I), I = the average index.

**Question 2.**

let n = 7, we have

1 + ½ + 1/3 + ¼ + 1/5 + 1/6 + 1/7

<= log(7 + 1)

log(8) = 3

let try 4 = log(16)

so check n=15(16-1)

do it similar as professor hint

1 + ½ + 1/3 + ¼ + 1/5 + 1/6 + 1/7 + 1/8 + 1/9 + 1/10 + 1/11 + 1/12 + 1/13 + 1/14 + 1/15

<= 1 + (1/2 + ½) + (1/4 + 1/4 + 1/4 + 1/4) + (1/8 + 1/8 + 1/8 + 1/8 + 1/8 + 1/8 + 1/8 + 1/8)

=  4

= log(15 + 1)

So f(n) <= log(n + 1), so f(n) <= logn

Therefore f(n) is **O(logn)**

**Question 3.**

S = 1/2 + 2/4 + 3/8 + 4/16 + 5/32 + …

S/2 = 1/4 + 2/8 + 3/16 + 4/32 + …

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S – S/2 = 1/2 + 1/4 + 1/8 + 1/16 + 1/32 + …

= (1/2)/(1-(1/2))

= 1

S(1-1/2) = 1

P = 1 – q, therefore,

Sp = 1

S = 1/p = 1/ (1/2) = 2