07/24/2019

P = Prob of success

$q = (1-P)$ = Prob of failure

Ex 1. a) $n = 2$

Ind

$p = 0.8$

$q = 1 - .8 = 0.2$

Mutually Exclusive.

Yes.

b) $P(1) = \frac{1}{52}$

$P(2) = \frac{1}{51}$

$P_1(\text{success}) = \frac{4}{52}$.

$P_2(\text{success}) = \frac{3}{51}$.

c) $n = 10$

$p = \frac{1}{4} = 0.25$

$q = 1 - \frac{1}{4} = 0.75$

$P(X) = {}^nC_x \, p^x \, q^{n-x} = \frac{n!}{(n-x)!\,x!} \, p^x \, q^{n-x}$.

Ex. 2.

$P(X=5) = {}^{10}C_5 \, (0.7)^5 \, (0.3)^5 = .1029$

The probability that the ... is successful for exactly 5 patients is about 0.1029 or 10.29%.

Binomial (n, p, x)

$P(X=5) = \text{binpdf}(10, 0.7, 5)$

b) $P(X \leq 7) = P(0) + P(1) + \cdots + P(7)$

$= \text{bin}(10, .7, 0) + \text{bin}(10, .7, 1) + \cdots$

$\text{bin}(10, .7, 7)$

$L_1 \rightarrow$ quit $\rightarrow$ 2nd vars $\rightarrow$ binpdf $(10; 0.7) \rightarrow$ sto L_2

$\rightarrow$ Enter.

L_1 L_2

x	$P(x)$
0	.0000
1	.0001
2	.0015
3	.0090
4	.0368
5	.1029
6	.2001
7	.2668
8	.02335
9	.1211
10	.0283

$P(x \le 7) = .6172$

$P(x < 7) = P(0) + P(1) + \dots + P(6)$

$\text{bin}(10, .7, 6) = 0.3504$

the prob of less than 7 patient have a success is about 0.3504.

d) $P(X > 1) = 1 - P(X \le 1)$

$= 1 - P(X=0) + P(X=1)$.

$= 0.999$

e) $P(X \geq 3) = P(3) + \cdots + P(0)$.

$= 1 - \cancel{e}P(X \leq 2)$.

$= 1 - \text{Bincdf}(10, 0.7, 2)$

$= 0.9984$

Ex 4

$n = 31$

$p = 0.38$

$q = 1 - .38 = 0.62$

$\mu = np = 31 \times 0.38 = 11.78$

so On Average the month of May will have about 12 clear days.

$\sigma^2 = 31 \times 0.38 \times 0.62 = 7.3036$. [No Rounding].

$\sigma = \sqrt{var}$

$= \sqrt{7.3036} \approx 2.7025$

On Avg there is a spread of 3 clear days from the mean of 12 clear days in SD,

$\boxed{\text{Rule of thumb}}$

$\mu - 2\sigma = 12 - 2 \times 3 = 6$

$\mu + 2\sigma = 12 + 2 \times 3 = 18$

Ex 7

$n = 100$ $\mu = 100 \times .5 = 50$

$p = 0.5$

$q = 0.5$

ON Avg if you flip a coin 100 times, you will get 50 Heads.

$\sigma^2 = 100 \times 0.5 \times 0.5 = 25$

$\sigma = \sqrt{25} = 5$

On Avg there is spread of 5.

$\mu - 2\sigma = 50 - 2 \times 5 = 40$

$\mu + 2\sigma = 50 + 2 \times 5 = 60$

12 is unusual.

Ex 3

$n = 10$

$p = 0.2$

$q = 0.8$

a) $P(X = 5) = bin(10, 0.2, 5) = 0.0264$

the prob that 5 out of 10 adults believe in reincar is about 0.0264

2.64%.

b) $P(X=10) = bin(10, 0.2, 10) = .000000124 \approx 0.$

There is hardly any chance that all 10 adults believe in reincar.

c) $P(X \geq 5) = 1 - P(X \leq 4) = 1 - bincdf(10, 0.2, 4)$

$= 0.0328$

d) $n = 6$

$X = 5$

$P(X=5) = binpdf(6, 0.2, 5) \approx 0.0015$

0.15%. Less than 5%