Statistics

Lecture 31

Feb 19-8:47 AM

Consider a binomial Prob. dist with

$n = 400$ and $p = .2$

1) $q = 1 - p$
$= \boxed{.8}$

2) $\mu = np$
$= 400(.2)$
$= \boxed{80}$

3) $\sigma^2 = npq$
$= 400(.2)(.8)$
$= \boxed{64}$

4) $\sigma = \sqrt{\sigma^2} = \sqrt{64} = \boxed{8}$

5) 68% Range $\mu \pm \sigma = 80 \pm 8 \Rightarrow \boxed{72 \text{ to } 88}$

6) Usual Range $\mu \pm 2\sigma = 80 \pm 2(8) \Rightarrow \boxed{64 \text{ to } 96}$
"95% Range"

7) P(exactly 75 successes)
$P(x = 75) = \text{binompdf}(400, .2, 75) = \boxed{.042}$

8) P(fewer than 75 successes)
$P(x < 75) = P(x \leq 74) = \text{binomcdf}(400, .2, 74)$
$= \boxed{.248}$

Oct 22-8:59 AM

9) P(# of successes is between 72 to 88, inclusive)

$P(72 \le x \le 88) = \text{binomcdf}(400, .2, 88)$

$- \text{binomcdf}(400, .2, 71)$

Reduce by 1

$= \boxed{.712}$

Oct 22-9:10 AM

Consider a geometric Prob. dist. with P=.2

1) $q = 1 - p$
$= 1 - .2 = \boxed{.8}$

2) $\mu = \frac{1}{p} = \frac{1}{.2} = \boxed{5}$

3) $\sigma^2 = \frac{q}{p^2} = \frac{.8}{.2^2} = \boxed{20}$

4) $\sigma = \sqrt{\sigma^2} = \sqrt{20} \approx \boxed{4.5}$

5) Usual Range
"95% Range"

$\mu \pm 2\sigma$
$= 5 \pm 2(4.5)$
$= 5 \pm 9$

$\boxed{-4 \text{ to } 14}$

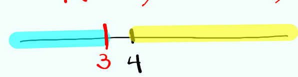
6) $P(x=3 \text{ or } x=6)$

$P(x=3) + P(x=6)$

$= \text{geometpdf}(.2,3) + \text{geometpdf}(.2,6) = \boxed{.194}$

7) P(First success happens after 3rd trial)

$P(x>3) = P(x \ge 4) = 1 - P(x \le 3)$



$= 1 - \text{geometcdf}(.2, 3)$

$= \boxed{.512}$

Oct 22-9:15 AM

Consider a poisson prob. dist. with $\mu=36$.

1) $\sigma^2 = \mu = \boxed{36}$

2) $\sigma = \sqrt{\sigma^2} = \sqrt{36} = \boxed{6}$

3) Usual Range $\mu \pm 2\sigma = 36 \pm 2(6)$

$= 36 \pm 12 \Rightarrow \boxed{24 \text{ to } 48}$

4) P($\underbrace{\text{exactly 40}}$ Successes)

$P(x=40) = \text{Poisson Pdf}(36,40) = \boxed{.051}$

5) P($\underbrace{\text{at most 45}}$ Successes)

$P(x \le 45) = \text{Poissoncdf}(36,45) = \boxed{.939}$

Oct 22-9:25 AM

Consider a True-False exam with unlimited questions.

Success is to guess correctly.

P=.5
No n.

P($\underline{\text{Correct guess}}$ happens of $\underline{\text{4th}}$ question)

$P(x=4) = \text{geometpdf}(.5,4) = \boxed{.0625}$

P(Correct guess happens $\underbrace{\text{before the}}$ 5th question)

$P(x<5) = P(x \le 4)$

$= \text{geometcdf}(.5,4) = \boxed{.9375}$

Oct 22-9:32 AM

According to a shipping Co., the number of late arrival is 4 in average Per driver in one week. $\mu = 4$ / wk

1) $\sigma^2 = \mu = 4$

2) $\sigma = \sqrt{\sigma^2} = \sqrt{4} = 2$

3) 68% Range $\mu \pm \sigma \Rightarrow \boxed{2 \text{ to } 6}$

4) P(exactly 2 packages arrive late per wk by driver)

$P(x=2) = \text{Poisson pdf}(4,2) = \boxed{.147}$

5) P(at most 8 are late /wk Per driver)

$P(x \leq 8) = \text{Poisson cdf}(4,8) = \boxed{.979}$

SG 16 → Binomial

SG 17 → Geometric & Poisson

Oct 22-9:38 AM

You buy a TKt for \$100

500 tKts are Sold.

1 tKt is drawn,

winner gets \$10,000

Find expected Value

Per TKt Sold by Fundraisers.

L1 Net	L2 P(Net)
100−10000	$\frac{1}{500}$
100 − 0	$\frac{499}{500}$

$E.V. = \mu = \bar{x}$

$\boxed{\$80}$

Oct 22-9:46 AM

I randomly Selected 100 Students.

35 were never late.

45 " late once.

15 " " twice

5 " " 3 times

L1 #late	L2 P(#Late)
0	.35
1	.45
2	.15
3	.05

$\mu = .9$

$\sigma = .831$

σ^2 in Red. Fraction

$\sigma^2 = \frac{69}{100}$

Oct 22-9:50 AM