Statistics

Lecture 16

Feb 19-8:47 AM

More on binomial Prob. Dist.

SG 16

Given $n = 40$, $P = .3$

1) $q = 1 - P = \boxed{.7}$

2) $np = (40)(.3) = \boxed{12}$

3) $npq = 40(.3)(.7) = \boxed{8.4}$

4) $\sqrt{npq} = \sqrt{8.4} \approx \boxed{3}$

Let x be # of successes,

4) $P(x = 15) = \text{binom pdf}(40, .3, 15) \approx \boxed{.077}$

5) $P(x \leq 15) = \text{binom cdf}(40, .3, 15) \approx \boxed{.885}$

6) $P(x \geq 15) = 1 - P(x \leq 14)$

we don't want | we want

15

14

$= 1 - \text{binom cdf}(40, .3, 14) = \boxed{.193}$

Apr 22-9:56 AM

Prob. of passing a math class is .6 Per Student.
50 students were randomly Selected.
Success is to pass the class.

1) $n = 50$ 2) $p = .6$ 3) $q = .4$

4) $np = 50(.6) = 30$ 5) $npq = 50(.6)(.4) = 12$ 6) $\sqrt{npq} = \sqrt{12} \approx 3.5$

7) P(exactly 35 students pass)
$P(x = 35) = \text{binompdf}(50, .6, 35) = .042$

8) P(fewer than 35 students pass)
$P(x < 35) = P(x \leq 34) = \text{binomcdf}(50, .6, 34) \approx .904$

9) P(more than 35 students pass)
$P(x > 35) = P(x \geq 36) = 1 - P(x \leq 35)$
$P(x \leq 35)$ $P(x \geq 36)$ 35 36 Total prob.
$= 1 - \text{binomcdf}(50, .6, 35) \approx .054$

Apr 22-10:11 AM

I flip a fair coin 400 times.
Success is to land tails.

1) $n = 400$ 2) $p = .5$ 3) $q = .5$

4) $np = 200$ 5) $npq = 100$ 6) $\sqrt{npq} = 10$

7) P(Lands tails between 190 & 210, inclusive)
$P(190 \leq x \leq 210)$ $P(x \leq 210)$ $P(x \leq 189)$ 189 190 210
$= P(x \leq 210) - P(x \leq 189)$
$= \text{binomcdf}(400, .5, 210) - \text{binomcdf}(400, .5, 189) \approx .706$

8) P(Land tails between 180 and 220, inclusive)
$= P(180 \leq x \leq 220) = P(x \leq 220) - P(x \leq 179)$
$= \text{binomcdf}(400, .5, 220) - \text{binomcdf}(400, .5, 179) \approx .960$

Apr 22-10:27 AM

Mean $\mu = np$

Variance $\sigma^2 = npq$

Standard Deviation $\sigma = \sqrt{\sigma^2}$

Binomial Prob. Dist.

Given $n = 400$, $P = .8$

1) $q = .2$ 2) $\mu = np = \boxed{320}$ 3) $\sigma^2 = npq = \boxed{64}$

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

5) Usual Range (95% Range) $\mu \pm 2\sigma = 320 \pm 2(8)$ $\Rightarrow \boxed{304 \text{ to } 336}$

6) $P(304 \le x \le 336) =$

$P(x \le 336) - P(x \le 303) =$

binomcdf(400, .8, 336) − binomcdf(400, .8, 303)

$\approx \boxed{.961} \approx 96\%$

Apr 22-10:43 AM

You are taking a multiple-choice exam.
You are making random guesses.
Each question has 3 choices but only one correct choice.
Exam has 60 questions.

1) $n = 60$ 2) $P = \frac{1}{3}$ 3) $q = \frac{2}{3}$

4) $\mu = np = 60\left(\frac{1}{3}\right) = \boxed{20}$ 5) $\sigma^2 = npq = 60\left(\frac{1}{3}\right)\left(\frac{2}{3}\right) = \boxed{\frac{40}{3}}$

6) $\sigma = \sqrt{\sigma^2} = \sqrt{\frac{40}{3}} = 3.651 \approx \boxed{4}$

7) Usual Range (95% Range) $\mu \pm 2\sigma = 20 \pm 2(4)$

$\approx \boxed{12 \text{ to } 28}$

8) P(guess correctly between 12 and 28, inclusive)

$P(12 \le x \le 28) = \text{binomcdf}(60, \frac{1}{3}, 28) -$ (Reduce by 1)

$\text{binomcdf}(60, \frac{1}{3}, 11) = \boxed{.981}$

Apr 22-10:53 AM