Hw 6.3 Part B pages 404-40 prob 79, 80, 81, 83, 85, 87-89

(79) X = the number of seeds that germinate $p = .85$ $1-p = .15$

a) $B(20, .85)$

$P(X = 17)$ BinoPdf(20, .85, 17) = $\boxed{.2428}$

where $n = 20$, $p = .85$ and $X = 17$

b) $P(X \le 12)$ BinoCdf(20, .85, 12) = .0059

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

where $n = 20$, $p = .85$, and $X \le 12$

There is about a .59 % chance of 12 or less seeds germinating. This would be surprising if this occurs and should make Judy suspicious that the claim is not true.

(80) w = the number of students who are left handed

$B(15, .10)$ $p = .10$ $1-p = .9$

a)

$P(w = 3) = \binom{15}{3}(.10)^3(.9)^{12}$ or binopdf(15, .10, 3) = $\boxed{.1285}$

$\binom{15}{3} = 455$

$\boxed{= .1285}$

where $n = 15$, $p = .10$ and $W = 3$

b) $P(w \ge 4) = 1 - P(w \le 3) = 1 - $ binocdf(15, .10, 3) = .056

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

where $n = 15$, $p = .10$, and $w \le 3$

About 5.6 % chance that 4 or more students selected will be left handed, so yes I would be surprised, but it is not completely unexpected.

B: yes S: reach f: reach'
I: yes
N: $n = 15$
S: $.20$ is fixed

(81) X = # of calls that reach a live person
$B(15, .20)$ * (need to check BINS 1st before stating this.) ←

a) $\mu_X = 15(.20) = 3$
You would expect to reach a live person an average of 3 phone calls when making 15 calls. (over & over again)

b) $\sigma_X = \sqrt{15(.20)(.80)} = 1.5$

When making "15 calls," you would expect the # of times you reach a live person to differ from the mean of 3 by an average of 1.5

(83) Y = # of calls that don't reach a live person
B: yes S: reach' f: reach
I: yes
N: $n = 15$
S: $p = .80$ is fixed so $B(15, .80)$

a) $\mu_Y = 15(.80) = 12$
(Notice $\mu_X = 3$ and $12 + 3 = 15$. In other words, if we reach an average of 3 Live Persons in our 15 calls, then we must not reach a live person in an average of 12 calls)

b) $\sigma_Y = \sqrt{15(.80)(.20)} = 1.549$

σ_X and σ_Y are the same thing as we have just switched the definitions of p and $1-p$

(85) $X =$ the number that operate for an hour without failure

a) B: yes S: operate for an hour w/o failure
F: does not operate for an hour w/o failure

I: yes: engine operation Ind. of each other
N: yes $n = 350$
S: yes, fixed $p = .999$
$\therefore$ Binomial Distribution of $B(350, .999)$

b) $\mu_X = 350(.999) = 349.65$

If we test 350 engines over and over again, we would expect that, on average 349.65 of them would operate for an hour w/o failure.

$\sigma_X = \sqrt{350(.999)(.001)} \approx .591$

In individual tests, we would expect to find the # of engines that operate for an hour w/o failure to differ/vary from the mean of 349.65 by an average of .591.

c) $P(X \leq 348) =$ Binocdf $(350, .999, 348) = .0486$
where $n = 350$, $p = .999$
and $X \leq 348$

There is about a 5% chance that 348 engines or less will operate for an hour w/o failure. (or about 5% chance of 2 or more engines failing)
Since there is such a small chance of 2 or more engines failing, it seems likely they are less reliable than they are supposed to be.

(87) We cannot use the binomial distribution because the sample size 10 is more than 10 % of the population of 76.

Population = $N = 76$
Sample = $n = 10$

Rule: $n \leq \frac{1}{10} N$

$10 \leq \frac{1}{10}(76)$

$10 \leq 7.6$

no ∴ cannot use binomial distribution

(88) Population = $N = 100$
Sample = $n = 7$

Rule: $n \leq \frac{1}{10} N$

$7 \leq \frac{1}{10}(100)$

$7 \leq 10$

yes

∴ we can use binomial distribution

b/c sample size 7 is less than 10 % of population

(89) If the sample size is more than 10 % of the population, the amount of change to makeup of the population is too much. The prob. of success changes too much to be considered constant.