Date

B+

29. a. $E(x) = \sum x \cdot p(x)$

$= \cancel{\quad} (1)(.05) + (2)(.10) + (4)(.35) + (8)(.4) + 16(.10)$

$= .05 + \cancel{0}\ .2 + 1.4 + 3.2 + 1.6$

$= 6.45$

b. $V(x) = \sum (x - 6.45)^2 \cdot p(x)$

$= (1-6.45)^2 \cdot (.05) + (2-6.45)^2 \cdot (.10) + (4-6.45)^2 (.35)$

$+ (8-6.45)^2 \cdot (.4) + (16-6.45)^2 (.10)$

$= \cancel{1.485125} \ 15.3185$

c. $\sigma_x = \sqrt{V(x)} = 3.914$

d. $V(x) = \sum x^2 \cdot p(x) - \cancel{2}(6.45)^2$

$= 57.25 - 41.6025$

$= 15.65$

33. a. $E(x^2) = \sum_{x=0}^{1} x^2 \cdot p(x) = (0^2)(1-p) + (1^2)p = p$

b. $V(x) = E(x^2) - [E(x)]^2 = p - p^2$

c. $E(x^{79}) = (0^{79})(1-p) + 1^{79}(p) = p.$

38. $E(h(x)) = E\left(\frac{1}{x}\right)$

$= p(x) \cdot \sum_{x=1}^{6} \left(\frac{1}{x}\right)$

$= \frac{1}{6} \sum_{x=1}^{6} \frac{1}{x}$

$= .408 > \frac{1}{3.5}$

So you can win more

$(aX+b) = \sum_x [aX+b-E(aX+b)]^2 \cdot p(x)$

$= \sum_x [aX+b-a\mu-b]^2 p(x)$

$= a^2 \sum_x [X-\mu]^2 p(x)$

$V(ax+b) = a^2 V(x).$

B+

46. a. $b(3;8,.35) = \binom{8}{3}(.35)^3(.65)^5 = .\cancel{659}\ .2785$

b. $b(5;8,.6) = \cancel{\binom{8}{5}(.6)^5(.4)^3} =$

$= \binom{8}{5}(.6)^5(.4)^3 = .2787$

c. $P(3 \le X \le 5) = b(3;7,.6) + b(4;7,.6) + b(5;7,.6)$

$= \binom{7}{3}(.6)^3(.4)^4 + \binom{7}{4}(.6)^4(.4)^3 + \binom{7}{5}(.6)^5(.4)$

$= \cancel{(35)}\ \cancel{0.48384}$

$= \cancel{1.035}\ 0.745$

d. $P(1 \le X) = 1 - P(X=0) = 1 - \binom{12}{0}(.1)^0(.9)^{12} = .718$

47. a. $b(4;15,.3) = 0.2186$

b. $b(6;15,.7) = 0.0116$

d. $P(2 \le X \le 4)$ when $X \sim Bin(15,.3)$

a. $\boxed{B(4;15,.3) = 0.515}$

$B(4;15,0.3) - B(2;15,0.3) = 0.48$

e. $P(2 \le X) = 1 - B(1;15,0.3) = 0.965$

f. $P(X \le 1) = B(1;15,0.7)$

48. $X \sim Bin(25, .05)$

a. $P(X \le 2) = B(2; 25, .05) = .873$

b. $P(X \ge 5) = 1 - P(X \le 4)$

$= .007$

c. $P(1 \le X \le 4) = P(X \le 4) - P(X \le 0)$

$= .716$

d. $P(X=0) = P(X \le 0) = .277$

e. $E(X) = np = 1.25$

$V(X) = np(1-p) = 1.1875$

$\sigma_X = 1.0897$

54. $X \sim Bin(10, .60)$

a. $P(X \ge 6) = 1 - P(X \le 5)$

$= .633$

b. $E(X) = np = 6$

$V(X) = np(1-p) = 2.4$

$\sigma_X = 1.55$

c. $P(3 \le X \le 7) = P(X \le 7) - P(X \le 2)$

$= 0.821$

68. a. $N=15$, $n=5$, $M=6$

b. $P(X=2) = \frac{\binom{6}{2}\binom{9}{3}}{\binom{15}{5}} = .280$

$P(X \le 2) = P(X=0) + P(X=1) + P(X=2)$
$= .573$

$P(X \ge 2) = 1 - P(X=1) = .706$

c. $E(X) = 5 \cdot \left(\frac{6}{15}\right) = 2$

$V(X) = .857$

$6 = \sqrt{V(X)} = .926$

69. $X \sim h(x; 6, 12, 7)$

a. $P(X=5) = \frac{\binom{7}{5}\binom{5}{1}}{\binom{12}{6}} = .114$

b. $P(X \le 4) = 1 - P(X=5) = 1 - \left[\frac{\binom{7}{5}\binom{5}{1}}{\binom{12}{6}} + \frac{\binom{7}{6}}{\binom{12}{6}}\right] = .879$

c. $E(X) = \left(\frac{42}{12}\right) = 3.5$

$6 = \sqrt{\left(\frac{6}{11}\right)(6)\left(\frac{7}{12}\right)\left(\frac{5}{12}\right)} = \sqrt{.795} = .892$

d. $P(X \le 5) \approx B(5; 15, .10) = .998$

a. $h(x; 6, 4, 11)$

b. $6 \cdot \frac{4}{11} = 2.18$

75 a. $P(X = x) = nb(x; 2, .5)$

~~b. $P_{(A)}^{\text{exactly } 4} = P(X \geq 2)$~~ $\sum^{2}$

b. $P(\text{exactly } 4) = nb(2; 2, .5)$

$= .188$

c. $P(\text{most } 4) = \sum_{x=0}^{2} nb(x; 2, .5)$

$= .688$

d. $E(x) = \frac{(2)(.5)}{.5} = 2$

$E(x+2) = E(x) + 2 = 4$.

79. a. $P(x \leq 8) = F(8; 5) = .932$

b. $P(x = 8) = F(8; 5) = .065$

c. $P(9 \leq x) = 1 - P(x \leq 8) = .068$

d. $P(5 \leq x \leq 8) = F(8; 5) - F(4; 5) = .492$

e. $P(5 < x < 8) = F(7; 5) - F(5; 5) = .251$

84. a. $n = 10000$ $p = .001$

$\mu = np = 10$ $\sigma = \sqrt{npq} = 3.161$

b. $P(x > 10) \approx 1 - F(10; 10) = .417$

c. $P(x = 0) \approx 0$

86. a. $P(X=4) = F(4;5) - F(3;5)$
$= .175$
b. $P(X \geq 4) = 1 - P(X \leq 3) = .735$
c. $\lambda = (5)(.75) = 3.75$

87. a. $\lambda t = 4 \times 2 = 8$
$P(X=10) = F(10;8) - F(9;8) = .099$
b. $\lambda t = (4)(.5) = 2$
$P(X=0) = F(0,2) = .135$
c. $E(X) = \lambda t = 2$