(3) $q = 1 - p = 0.6$

$n - x = 6 - 3 = 3$

$(nCx)\, p^{x} q^{n-x}$

$= 6C3\, (0.4)^3 (0.6)^3$

$= 20\, (0.4)^3 (0.6)^3$

≈ 0.28

(5) $q = 1 - p = \frac{1}{3}$

$n - x = 4 - 3 = 1$

$(nCx)\, p^{x} q^{n-x}$

$= 4C3\, \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^1$

$= 4\, \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)$

≈ 0.40

(21) $x = $ # of 6's rolled

$n = 3$

$p = P(\text{roll a } 6) = \frac{1}{6}$

$q = 1 - p = \frac{5}{6}$

$$P(x \geq 2) = P(x=2) + P(x=3)$$

$$= 3C2\left(\frac{1}{6}\right)^2\left(\frac{5}{6}\right) + 3C3\left(\frac{1}{6}\right)^3\left(\frac{5}{6}\right)^0$$

$$= 3\left(\frac{1}{6}\right)^2\left(\frac{5}{6}\right) + \left(\frac{1}{6}\right)^3$$

$$\approx 0.07$$

(25) $x = \#$ of hits

$n = 4$

$p = P(\text{hit}) = 0.350 = 0.35$

$q = 1 - p = 0.65$

a) $P(x=2)$

$= 4C2\,(0.35)^2(0.65)^2$

$= 6\,(0.35)^2(0.65)^2$

≈ 0.31

b) $P(x \geq 2)$

$= P(x=2) + P(x=3) + P(x=4)$

$= 1 - P(x=0) - P(x=1)$

$= 1 - 4C0\,(0.35)^0(0.65)^4 - 4C1\,(0.35)^1(0.65)^3$

$= 1 - 0.65^4 - 4\,(0.35)(0.65)^3$

≈ 0.44

(43) $x = \#$ who complete program

$n = 7$

$p = P(\text{complete}) = 0.7$

$q = 1 - p = 0.3$

a) $P(x=5)$

$= 7C5\,(0.7)^5(0.3)^2$

$= 21\,(0.7)^5(0.3)^2$

≈ 0.32

b) $P(x \geq 5)$

$= P(x=5) + P(x=6) + P(x=7)$

$= 7C5\,(0.7)^5(0.3)^2 + 7C6\,(0.7)^6(0.3)^1 +$
$7C7\,(0.7)^7(0.3)^0$

$= 21\,(0.7)^5(0.3)^2 + 7(0.7)^6(0.3) + 0.7^7$

≈ 0.65

45 Rephrasing the question:
what is the probability that more than 2 defective items are produced?

x = # of defective items

$n = 10$

$p = P(\text{defective}) = \frac{6}{100} = 0.06$

$q = 1 - p = 0.94$

$P(x>2)$

$= P(x=3) + P(x=4) + \ldots + P(x=10)$

$= 1 - P(x=0) - P(x=1) - P(x=2)$

$= 1 - {}_{10}C_0 (0.06)^0 (0.94)^{10} - {}_{10}C_1 (0.06)^1 (0.94)^9 - {}_{10}C_2 (0.06)^2 (0.94)^8$

$= 1 - 0.94^{10} - 10(0.06)(0.94)^9 - 45(0.06)^2(0.94)^8$

≈ 0.02

(49) x = # of specialists who detect tuberculosis

$n = 4$

$p = P(\text{detect}) = 0.8$

$q = 1 - p = 0.2$

$P(x \geq 1)$

$= P(x=1) + P(x=2) + \ldots + P(x=4)$

$= 1 - P(x=0)$

$= 1 - {}_4C_0 (0.8)^0 (0.2)^4$

$= 1 - 0.2^4$

≈ 0.998

(51) $x = \#$ of brown-eyed children

$n = 5$

$p = 0.75$

$q = 1 - p = 0.25$

a) $P(x=0)$

$= 5C0\,(0.75)^0\,(0.25)^5$

$= 0.25^5$

≈ 0.001

b) $P(x=3)$

$= 5C3\,(0.75)^3\,(0.25)^2$

$= 10\,(0.75)^3\,(0.25)^2$

≈ 0.26

$\rightarrow$

51 Cont'd

c) $P(x \geq 3)$

$= P(x=3) + P(x=4) + P(x=5)$

$= 5C3\,(0.75)^3(0.25)^2 + 5C4\,(0.75)^4(0.25)^1 + 5C5\,(0.75)^5(0.25)^0$

$= 10(0.75)^3(0.25)^2 + 5(0.75)^4(0.25) + 0.75^5$

≈ 0.90

53 d) Compute the mean only.

For a binomial experiment,

$\mu = np$

$\mu = 6(0.6)$

$\mu = 3.6$

This could also be written

$E(X) = 3.6$