

32.

x	16	18	20
$p(x)$.2	.5	.3

a. Compute $E(x)$, $E(x^2)$, $V(x)$

$$E(x) = x_1 p(x_1) + x_2 p(x_2) + x_3 p(x_3)$$

$$= 16 \times p(16) + 18 \times p(18) + 20 \times p(20)$$

$$= 16 \times .2 + 18 \times .5 + 20 \times 0.3$$

$$= \underline{\underline{18.2}}$$

$$E(x^2) = x_1^2 p(x_1) + x_2^2 p(x_2) + x_3^2 p(x_3)$$

$$= 16^2 \times p(16) + 18^2 \times p(18) + 20^2 \times p(20)$$

$$= 16^2 \times 0.2 + 18^2 \times 0.5 + 20^2 \times .3$$

$$= \underline{\underline{333.2}}$$

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

$$= 333.2 - [18.2]^2$$

$$= \underline{\underline{1.96}}$$

b)

$$E(\text{price}) = E(70x - 650)$$

$$= 70 E(x) - 650$$

$$= (70)(18.2) - 650$$

$$= \underline{\underline{624}}$$

c)

$$V(\text{price}) = V(70x - 650)$$

$$= 70^2 V(x) - 0$$

$$= 70^2 \times 1.96$$

$$= \underline{\underline{9604}}$$

d).

$$E(x) - 0.008 E(x^2)$$

$$= 18.2 - 0.008 [333.2]$$

$$= 18.2 - 2.6656$$

$$= \underline{\underline{15.5344}}$$

Q 33

a. Compute $E(x^2)$

$$E(x^2) = \sum x^2 p(x)$$

$$= [0^2 \times p(0)] + [1^2 \times p(1)]$$

$$= [0^2 \times (1-p)] + [1^2 \times p]$$

$$= \underline{\underline{p}}$$

b. Show that $V(x) = p(1-p)$

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

$$= p - [p]^2$$

$$= p - p^2$$

$$= \underline{\underline{p(1-p)}}$$

c.

$$E(x^{79}) = [0^{79} \times p(0)] + [1^{79} \times p(1)]$$

$$[0^{79} \times (1-p)] + [1^{79} \times p]$$

$$= \underline{\underline{p}}$$

38.

a. Calculate $E(x)$ and then $E(5-x)$

$$E(x) = \sum_{i=1}^4 x_i p(x_i)$$

$$= 1(0.15) + 2(.35) + 3(.35) + 4(.15)$$

$$= \underline{2.5} = E(x) = 2.5$$

$$E(5-x) = 5 - E(x)$$

$$= 5 - 2.5$$

$$= \underline{2.5} = E(5-x) = 2.5$$

b.

$$E\left(\frac{150}{5-x}\right)$$

x	$p(x)$	$x p(x)$
$\frac{150}{5-1} = 37.5$.15	5.625
50	.35	17.5
75	.35	26.25
150	.15	22.5

$$E(x) = \sum x p(x) = \underline{71.875}$$

* The repair facility would be better off charging a \$75 flat fee

Q 48)

a. Determine both $P(X \leq 3)$ and $P(X < 3)$

$$P(X \leq 3) = \sum_{y=0}^3 \binom{25}{y} (0.05)^y (1-0.05)^{25-y}$$

$$= \binom{25}{0} (0.05)^0 (1-0.05)^{25-0} + \binom{25}{1} (0.05)^1 (1-0.05)^{25-1}$$

$$+ \binom{25}{2} (0.05)^2 (1-0.05)^{25-2} + \binom{25}{3} (0.05)^3 (1-0.05)^{25-3}$$

$$= 0.27739 + 0.36499 + 0.23052 + 0.09302$$

$$= 0.966$$

$$\underline{P(X \leq 3) = 0.966}$$

$$P(X \leq 2) = \sum_{y=0}^2 \binom{25}{y} (0.05)^y (1-0.05)^{25-y}$$

$$= \binom{25}{0} (0.05)^0 (1-0.05)^{25-0} + \binom{25}{1} (0.05)^1 (1-0.05)^{25-1}$$

$$+ \binom{25}{2} (0.05)^2 (1-0.05)^{25-2}$$

$$= 0.27739 + 0.36499 + 0.23052$$

$$= 0.873$$

$$\underline{P(X < 3) = 0.873}$$

b.

$$P(x \geq 4)$$

$$P(x \geq 4) = 1 - P(x \leq 3)$$

$$= 1 - 0.966$$

$$= 0.034$$

$$P(x \geq 4) = \underline{\underline{0.034}}$$

c. $P(1 \leq x \leq 3)$

$$P(1 \leq x \leq 3) = P(x = 1, 2 \text{ or } 3)$$

$$= P(x \leq 3) - P(x \leq 0)$$

$$= 0.966 - 0.277$$

$$= 0.689$$

$$\underline{\underline{P(1 \leq x \leq 3) = 0.689}}$$

d.

$$E(x) = np$$

$$\sigma_x = \sqrt{npq}$$

$$E(x) = 25 \times (0.05)$$

$$= \underline{\underline{1.25}}$$

$$e. \binom{50}{0} (0.05)^0 (1-0.05)^{50-0}$$

$$1 \times 1 \times (0.95)^{50} =$$

$$\underline{\underline{0.077}}$$