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...hen you finish the homework,

A+

29. sol:

a. $E(X) = 1 \times 0.05 + 2 \times 0.1 + 4 \times 0.35 + 8 \times 0.40 + 16 \times 0.1$

$= 6.45$

b. $V(X) = \sum_x (x - E(x))^2 \cdot p(x)$

$= 5.45^2 \times 0.05 + 4.45^2 \times 0.1 + 2.45^2 \times 0.3 + 1.55^2 \times 0.4 + 9.55^2 \times 0.1$

$= 15.347375$

c. $\sigma = \sqrt{V(X)}$

≈ 3.9176

d. $V(X) = [\sum_x x^2 p(x)] - [E(x)]^2$

$= [1^2 \times 0.05 + 2^2 \times 0.10 + 4^2 \times 0.35 + 8^2 \times 0.40 + 16^2 \times 0.10] - 6.45^2$

$= 15.6475$

33. **Example 3.18** Let $X = 1$ if a randomly selected vehicle passes an emissions test and $X = 0$ otherwise. Then X is a Bernoulli rv with pmf $p(1) = p$ and $p(0) = 1 - p$, from which $E(X) = 0 \cdot p(0) + 1 \cdot p(1) = 0(1 - p) + 1(p) = p$. That is, the expected value of

$= [1^2 \times 0.05 + 2^2 \times 0.10 + 4^2 \times 0.25$
$+ 8^2 \times 0.10 + 10^2 \times 0.10] - 6.45^2$

$= 15.6475$

33.

Example 3.18 Let $X = 1$ if a randomly selected vehicle passes an emissions test and $X = 0$ otherwise. Then X is a Bernoulli rv with pmf $p(1) = p$ and $p(0) = 1 - p$, from which $E(X) = 0 \cdot p(0) + 1 \cdot p(1) = 0(1 - p) + 1(p) = p$. That is, the expected value of X is just the probability that X takes on the value 1. If we conceptualize a population consisting of 0s in proportion $1 - p$ and 1s in proportion p, then the population average is $\mu = p$. ■

a. $E(X^2) = 0^2 \times (1-p) + 1^2 \times p + 0$

$= p$

b. $V(X) = (0-p)^2(1-p) + (1-p)^2 p$

$= p^2 - p^3 + (1 - 2p + p^2)p$

$= p - p^2$

$= p(1-p)$

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

$= p$

38. Sol:

1/3.5 : $E(X_1) = \frac{n \cdot \frac{1}{3.5}}{n} = \frac{1}{3.5} = 0.1429$

$\frac{1}{+}$

$\because E(X^{79}) = 0^{79} \times (1-p) + 1^{79} \times p + \cdots$

$= p$

38. Sol:

1/3.5 : $E(X_1) = \frac{n \cdot \frac{1}{3.5}}{n} = \frac{1}{3.5} = 0.1429$

1/X : $E(X_2) = (\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6}) \times \frac{1}{6}$

≈ 0.4083

Since $E(X_2) > E(X_1)$

I choose to gamble

41. Sol:

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

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

$= \Sigma[a(X-E(x))]^2 \cdot p(x)$

$= a^2 \cdot \Sigma (X-E(x))^2 \cdot p(x)$

$= a^2 \cdot \sigma^2$

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