M 362K Post-Class Homework 10

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4-7

(a)

$Pr(68 < X \leq 85) = \frac{85-68}{100} = \frac{17}{100}$

(b)

This is a discrete uniform distribution with probability $\frac{1}{100}$

$\therefore E[X] = \frac{1+100}{2} = 50.5$

(c)

Since this is a discrete uniform distribution, there is no mode

(d)

$Var[X] = \frac{100^2-1}{12} = 833.25$

4-10

Let $W = 5X + 45$, where X has the discrete uniform distribution on $1, 2, 3, 4, 5$

(a)

$Pr(W \geq 55) = Pr(5X + 45 \geq 55) = Pr(X \geq 2) = \frac{4}{5}$

(b)

$E[W] = E[5X + 45] = 5E[X] + 45 = 5 * \frac{1+5}{2} + 45 = 60$

(c)

$Var[Y] = Var[5X + 45] = 5^2 * Var[X] = 25 * \frac{5^2-1}{12} = 50$

$\therefore \sigma_W = \sqrt{Var[Y]} = \sqrt{50} = 7.07$

4-11

Statement I: The probability distribution of Y is uniform, which is $\frac{1}{n}$

Statement II: The expected value of Y is $E[Y] = E[aX + b] = aE[X] + b$, where $E[X]$ is the expected value of X

Statement III: The variance of Y is $Var[Y] = a^2 Var[X]$, where $Var[X]$ is the variance of X

4-21

Let X be the random variable which denotes the number of passengers show up

$Pr(X > 30) = Pr(X = 31) + Pr(X = 32) = {}_{32}C_{31}0.9^3 1 * 0.1 + 0.9^3 2 = 0.1564$

Therefore the answer is (E)

4-22

Let X be the random variable which denotes the number of hurricanes in a 20-year period

$Pr(X < 3) = Pr(X = 0) + Pr(X = 1) + Pr(X = 2) = 0.95^{20} + {}_{20}C_1 0.05 * 0.95^{19} + {}_{20}C_2 0.05^2 *$

$0.95^{18} = 0.92$

Therefore the answer is (E)

4-24

$E[X] = n * p = 5 * 0.65 = 3.25$

$Pr(X > E[X]) = Pr(X = 4) + Pr(X = 5) = {}_5C_4 0.65^4 * 0.35 + 0.65^5 = 0.428415$