

Quiz #1

$$0.1 + 0.5 + 3p + 2p + p = \underline{1}$$

$$0.6 + 6p = 1$$

$$6p = 0.4$$

$$p = \frac{0.4}{6} = \frac{4}{60} = \frac{1}{15}$$

y	0	1	2	3	4
P	0.1	0.5	$\frac{1}{5}$	$\frac{2}{15}$	$\frac{1}{15}$

$$E(X) = 0.1(0) + 0.5(1) + \frac{1}{5}(2) + \frac{2}{15}(3) + \frac{1}{15}(4)$$

$$= 0 + \frac{15 \cancel{1}}{30 \cancel{2}} + \frac{12 \cancel{2}}{30 \cancel{5}} + \frac{12 \cancel{6}}{30 \cancel{15}} + \frac{8 \cancel{4}}{30 \cancel{15}}$$

$$= \frac{47}{30} \quad \text{or } 1.57$$

(d) Find the variance of the distribution

$$E(X^2) = 0.1(0^2) + 0.5(1^2) + \frac{1}{5}(2^2) + \frac{2}{15}(3^2) + \frac{1}{15}(4^2)$$

$$= 0 + \frac{1}{2} + \frac{4}{5} + \frac{18}{15} + \frac{16}{15}$$

$$= \frac{107}{30}$$

$$\begin{aligned}P(X=1) &= \binom{2}{1} \left(\frac{1}{6}\right)^1 \left(\frac{5}{6}\right)^1 \\&= 2 \cdot \frac{5}{36} \\&= \frac{10}{36}\end{aligned}$$

$$\begin{aligned}P(X=2) &= \binom{2}{2} \left(\frac{1}{6}\right)^2 \left(\frac{5}{6}\right)^0 \\&= \frac{1}{36}\end{aligned}$$

$$E(X) = np = 2 \left(\frac{1}{6}\right) = \frac{1}{3}$$

$$\textcircled{\text{OR}} E(X) = \frac{75}{36} (0) + \frac{10}{36} (1) + \frac{1}{36} (2) = \frac{12}{36}$$

$$\sigma^2 = npq = 2 \left(\frac{1}{6}\right) \left(\frac{5}{6}\right) = \frac{10}{36} \text{ or } \frac{5}{18}$$

EX. Toss 20 coins.

X = number of \textcircled{H}

$$(a) P(X=10) = \binom{20}{10} \left(\frac{1}{2}\right)^{10} \left(\frac{1}{2}\right)^{10}$$

$$\text{binomial/pdf}(20, 1/2, 10) - \\ = 0.176$$

$$(b) P(X < 10) = P(X \leq 9)$$

$$(c) P(X > 7) = 1 - P(X \leq 7)$$

Ex. Roll 35 dice.

$X = \text{number of } \square + \text{number of } \square$

$$(a) P(X = 12) = 0.140$$

$$E(X) = 35 \cdot \frac{1}{3}$$
$$= 11\frac{2}{3}$$

$$(b) P(X \geq 14) = 1 - P(X \leq 13)$$
$$= 0.252$$

EX A widget factory produces widgets, of which 1.5% are defective.

Select a random sample of 12 widgets.

$X = \text{number of defects.}$

$$(a) P(X = 0) = \text{binomialpdf}(12, 0.015, 0)$$
$$= 0.834$$

$$(b) P(\text{at least 2 defects}) = 1 - P(X \leq 1)$$
$$= 0.0134$$

(c) You select 5 batches of 12 widgets. What is the probability that no more than 2 of the 5 batches have any defects.

Y = number of batches that are defect-free.

$$Y \sim B(5, 0.834)$$

y	0	1	2	3	4	5

HW

15C 531	# 1-3
15D 533	# 3-6

Mon

Big Quiz