HW6

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Question 7:

26 cards, diff alphabet letter on each

Vowel = 3 pts

Consonant = 1 pt

a) Distribution of X b) Expected Value of X c) Variance of X

$P(\text{vowel}) = \frac{5}{26} * 3 = \frac{15}{26}$

$1 - \frac{15}{26} = \frac{11}{26}$ new P(cons)

$P(\text{consonant}) = \frac{21}{26}$

$E(X) = \frac{15}{26}$, expected value

$$V(X) = \sum_{s \in S} (X(s) - E(X))^2 p(s)$$

$$= E(X^2) - E(X)^2$$

$$= 1.38$$

3 pts * 5 vowels = 15 pts

1 pt * 21 consonants = 21 pts

There are 36 total points in one deck of 26 cards

P of drawing one vowel = $\frac{1}{36} \cdot (\frac{1}{26})^3 = \frac{3}{26} = \frac{1}{12}$ Total pts for randomly drawing 1 vowel

P of drawing one consonant = $\frac{1}{36}$ Total pts for drawing 1 consonant

Question 8:

Two decks of 26 cards each. Pick 1 card at random from each of two decks

Vowels = {a, e, i, o, u} = 5

Cons = 26 − 5 = 21

$$P(\text{consonant}) = \frac{21C_1}{26C_1} = \frac{21}{26}$$

$$P(\text{vowel}) = \frac{5C_1}{26C_1} = \frac{5}{26}$$

$P(x=2)$ Probability that two consonants are picked from both decks

$$= \left(\frac{21}{26}\right)\left(\frac{21}{26}\right) \text{ or } \left(\frac{21}{26}\right)^2$$

$P(x=4)$ Probability of picking one consonant and one vowel

$$= \left(\frac{21}{26}\right)\left(\frac{5}{26}\right) + \left(\frac{5}{26}\right)\left(\frac{21}{26}\right)$$

$P(x=6)$ Probability of picking two vowels

$$\left(\frac{5}{26}\right)^2$$

a) Distribution

x	2	4	6
$P(x)$	$\left(\frac{21}{26}\right)^2$	$2\left(\frac{21}{26}\right)\left(\frac{5}{26}\right)$	$\left(\frac{5}{26}\right)^2$

b) Expected Value

$$E(x) = 2[P(x=2)] + 4[P(x=4)] + 6[P(x=6)]$$

$$= \boxed{2.77}$$

Question 9:

a) Expected sum (two dice, 3 comes up 2x as often as other #s)

$= \frac{1}{7}(1) + \frac{1}{7}(2) + \frac{1}{7}(3) + \frac{1}{7}(3) + \frac{1}{7}(4) + \frac{1}{7}(5) + \frac{1}{7}(6)$

$= \frac{24}{7} * 2 = \boxed{\frac{48}{7}}$

b) S = sum

$E(S) = E(X_1 + X_2 + X_3)$

$= E(X_1) + E(X_2) + E(X_3)$

Since 3 dices are fair

$= 3 * E(X)$

$= 3\left[1\left(\frac{1}{6}\right) + 2\left(\frac{1}{6}\right) + 3\left(\frac{1}{6}\right) + 4\left(\frac{1}{6}\right) + 5\left(\frac{1}{6}\right) + 6\left(\frac{1}{6}\right)\right]$

$= 3(3.5) = 10.5$