Q-10.13.3.10

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Question: All the jacks, queens and kings are removed from a deck of 52 playing cards. The remaining cards are well shuffled and then one card is drawn at random. Giving ace a value 1 similar value for other cards, find the probability that the card has a value

1) 7
2) greater than 7
3) less than 7

Solution: Number of cards left after removing all jacks, queens and kings(=N)

$$= 52 - 4 \times 3 \tag{1}$$

$$= 40 \tag{2}$$

Parameter	Value	Description
X	1-10	Represents the value of the card picked

Finding pmf:

$$p_X(k) = \Pr(X = k) \tag{3}$$

$$= \frac{4 \times 1}{40} \tag{4}$$

$$= \frac{1}{10} \tag{5}$$

$$\tag{6}$$

CDF for the following pmf is:

$$F_X(k) = \sum_{k=k_0}^{k=k_1} p_X(k) \tag{7}$$

$$= (k_1 - k_0 + 1) \times \frac{1}{10} \tag{8}$$

1) Probability that card has value equal to 7:

$$= F_X(k);\ k = 7 \tag{9}$$

$$= 1 \times \frac{1}{10} = \frac{1}{10} \tag{10}$$

2) Probability that card has value greater than 7

$$= F_X(k);\ 8 \le k \le 10 \tag{11}$$

$$= 3 \times \frac{1}{10} = \frac{3}{10} \tag{12}$$

3) Probability that card has value less than 7

$$= F_X(k);\ 1 \le k \le 6 \tag{13}$$

$$= 6 \times \frac{1}{10} = \frac{6}{10} \tag{14}$$