

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)

$$= 52 - 4 \times 3 \quad (1)$$

$$= 40 \quad (2)$$

Parameter	Value	Description
X_1	4	the card has value 7 and is of any suit
X_2	12	the card has value greater than 7 and is of any suit
X_3	24	the card has value less than 7 and is of any suit

- 1) Probability that card has value equal to 7

$$= p_{X_1}(k); k = 7 \quad (3)$$

$$= Pr(X_1 = 7) \quad (4)$$

$$= \frac{4}{40} \quad (5)$$

$$= \frac{1}{10} \quad (6)$$

- 2) Probability that card has value greater than 7

$$= \sum_{k=8}^{10} p_{X_2}(k) \quad (7)$$

$$= \sum_{k=8}^{10} Pr(X_2 = k) \quad (8)$$

$$= \frac{12}{40} \quad (9)$$

$$= \frac{3}{10} \quad (10)$$

3) Probability that card has value less than 7

$$= \sum_{k=1}^6 p_{X_3}(k) \quad (11)$$

$$= \sum_{k=1}^6 Pr(X_3 = k) \quad (12)$$

$$= \frac{24}{40} \quad (13)$$

$$= \frac{6}{10} \quad (14)$$