Assignment 1

AI1110: Probability and Random Variables
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Five cards—the ten, jack, queen, king and ace of diamonds, are well-shuffled with their face downwards. One card is then picked up at random. (i)What is the probability that the card is the queen? (ii) If the queen is drawn and put aside, what is the probability that the second card picked up is (a) an ace? (b) a queen?

Solution:
Let E be the event of picking a card.
Let S be the sample space of picking a card.
Let Q be the event of the card picked be Queen.
Let A be the event of the card picked be an Ace.

i. Total number of cards = 5
Number of cards that are queen = 1

$$\Pr(E) = \frac{n(E)}{n(S)} \tag{1}$$

$$\Pr(Q) = \frac{n(Q)}{n(S)} \tag{2}$$

$$\therefore \Pr(Q) = \frac{1}{5} \tag{3}$$

ii. [a.]
Total number of cards = 4
Number of cards that are Ace = 1

$$\Pr(E) = \frac{n(E)}{n(S)} \tag{4}$$

$$\Pr(A) = \frac{n(A)}{n(S)} \tag{5}$$

$$\therefore \Pr(A) = \frac{1}{4} \tag{6}$$

ii. [b.]
Total number of cards = 4
Number of cards that are Queen = 0

$$\Pr(Q) = \frac{n(Q)}{n(S)} \tag{7}$$

$$\Pr(Q) = \frac{0}{4} = 0 \tag{8}$$

$$\therefore \Pr(Q) = 0 \tag{9}$$