

Assignment-1

(10.15.1.9)

AI1110:Probability and Random Variables

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Question: A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be :

- (i) red ?
- (ii) white ?
- (iii) not green?

Solution :

Number of red marbles = 5
Number of white marbles = 8
Number of green marbles = 4
Total marbles = 5+8+4 = 17
Let

$$N = R + W + G \quad (1)$$

$$n = r + w + g \quad (2)$$

where R,B,G and r, b, g represent the number of red, white and green marbles respectively within N and n. Then :

$$\Pr(r, w, g) = \frac{{}^R C_r {}^W C_w {}^G C_g}{{}^{R+W+G} C_{r+w+g}} \quad (3)$$

- (i) Probability that the marble taken out is red

$$\Pr(1, 0, 0) = \frac{{}^5 C_1 {}^8 C_0 {}^4 C_0}{{}^{17} C_1} \quad (4)$$

$$= \frac{5}{17} \approx 0.2941 \quad (5)$$

- (ii) Probability that the marble taken out is white

$$\Pr(0, 1, 0) = \frac{{}^5 C_0 {}^8 C_1 {}^4 C_0}{{}^{17} C_1} \quad (6)$$

$$= \frac{8}{17} \approx 0.4706 \quad (7)$$

- (iii) Probability that the marble taken out is not green

$$1 - \Pr(0, 0, 1) = 1 - \frac{{}^5 C_0 {}^8 C_0 {}^4 C_1}{{}^{17} C_1} \quad (8)$$

$$= 1 - \frac{4}{17} = \frac{13}{17} \approx 0.7647 \quad (9)$$