

Probability Assignment 1

EE22BTECH11217 - Sayan Biswas

1 PROBLEM STATEMENT

Two balls are drawn at random with replacement from box containing 10 black and 8 red balls. Find the probability that :

- 1) both balls are red
- 2) first ball is black and second ball is red
- 3) one of them is black the other one is red

2 ANSWER

Assume random variable X and Y:

- X: Colour of first ball picked

$$X = \begin{cases} 1, & \text{for red ball} \\ 0, & \text{for black ball} \end{cases}$$

- Y: Colour of second ball picked

$$Y = \begin{cases} 1, & \text{for red ball} \\ 0, & \text{for black ball} \end{cases}$$

- Both balls are red :

$$= \Pr(X = 1, Y = 1) \quad (1)$$

$$= \frac{8}{18} \times \frac{8}{18} \quad (2)$$

$$= \frac{16}{81} \quad (3)$$

- Both balls are red :

$$= \Pr(X = 0, Y = 1) \quad (4)$$

$$= \frac{10}{18} \times \frac{8}{18} \quad (5)$$

$$= \frac{20}{81} \quad (6)$$

- Both balls are red :

$$= \Pr(X = 1, Y = 0) + \Pr(X = 0, Y = 1) \quad (7)$$

$$= \frac{8}{18} \times \frac{10}{18} + \frac{10}{18} \times \frac{8}{18} \quad (8)$$

$$= \frac{40}{81} \quad (9)$$