## Probability Assignment 1

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## 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:

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

$$=\frac{8}{18}\times\frac{8}{18}\tag{2}$$

$$=\frac{16}{81}\tag{3}$$

• Both balls are red:

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

$$=\frac{10}{18}\times\frac{8}{18}\tag{5}$$

$$=\frac{20}{81}\tag{6}$$

• Both balls are red:

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

$$= \frac{8}{18} \times \frac{10}{18} + \frac{10}{18} \times \frac{8}{18} \tag{8}$$

$$= \frac{40}{81} \tag{9}$$