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

$$X = \left\{ \begin{array}{l} 1, \text{ for red ball} \\ 0, \text{ for black ball} \end{array} \right\}$$

- Y: Colour of second ball picked

$$Y = \left\{ \begin{array}{l} 1, \text{ for red ball} \\ 0, \text{ for black ball} \end{array} \right\}$$

- Both balls are red :

$$= \Pr\left(X = 1, Y = 1\right) \quad (1)$$
$$= \frac{8}{18} \times \frac{8}{18}$$
$$= \frac{16}{81}$$

- Both balls are red :

$$= \Pr\left(X = 0, Y = 1\right) \quad (2)$$
$$= \frac{10}{18} \times \frac{8}{18}$$
$$= \frac{20}{81}$$

- Both balls are red :

$$= \Pr\left(X = 1, Y = 0\right) + \Pr\left(X = 0, Y = 1\right) \quad (3)$$
$$= \frac{8}{18} \times \frac{10}{18} + \frac{10}{18} \times \frac{8}{18}$$
$$= \frac{40}{81}$$