

FIT5201_2018S2_Assignment 1-SectionC-Question 4

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Since the chance of picking the red box is 40%, the probabilities of selecting either the red or the blue boxes are given by

$$p(B = r) = 0.4, p(B = b) = 0.6.$$

There are 2 apples and 6 oranges in the red box, while 3 apples and 1 oranges are in the blue box. Then, since the selection change for any of the pieces from a box is equal, we can have:

$$p(F = a|B = r) = 0.25, p(F = o|B = r) = 0.75, p(F = a|B = b) = 0.75, \\ p(F = o|B = b) = 0.25$$

By the use of the sum and product rules of probability:

$$p(F = o) = p(F = o|B = r)p(B = r) + p(F = o|B = b)p(B = b) = 0.75 \times 0.4 + 0.25 \times 0.6 = 0.45$$

By using Bayes' theorem:

$$p(B = b|F = o) = \frac{p(F = o|B = b)p(B = b)}{p(F = o)} = \frac{0.25 \times 0.6}{0.45} = \frac{1}{3}$$

Hence, If the pricked fruit is an orange, the probability that it was picked from the blue box is $\frac{1}{3}$.