Probability

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Question 1

i

$$= \frac{5}{12} * \frac{4}{11} * \frac{3}{10} = 0.04545 = 4.55\%$$

ii

$$= \left(\frac{5}{12} * \frac{4}{11} * \frac{3}{10}\right) + \left(\frac{4}{12} * \frac{3}{11} * \frac{2}{10}\right) + \left(\frac{3}{12} * \frac{2}{11} * \frac{1}{10}\right) = 0.06818 = 6.82\%$$

iii

Assuming starts with Jam:

$$= \left(\frac{5}{12} * \frac{4}{11} * \frac{3}{10}\right) + \left(\frac{5}{12} * \frac{3}{11} * \frac{4}{10}\right)$$
$$= \frac{5}{12}\left(\left(\frac{4}{11} * \frac{3}{10}\right) + \left(\frac{3}{11} * \frac{4}{10}\right)\right)$$
$$= 0.909090$$

Assuming starts with Cream:

$$= \frac{4}{12}\left(\left(\frac{5}{11} * \frac{3}{10}\right) + \left(\frac{3}{11} * \frac{5}{10}\right)\right)$$
$$= 0.909090$$

Assuming starts Plain:

$$= \frac{3}{12}\left(\left(\frac{5}{11} * \frac{4}{10}\right) + \left(\frac{4}{11} * \frac{5}{10}\right)\right)$$
$$= 0.909090$$

Overall:

$$= 0.909090 * 3 = 0.2727 = 27.3\%$$

Question 2

i

Question 3

To get equal balls, one of the ball counts must be 1 away from the other 2 ball counts, with sign changes, which leaves 2 possibilities:

$$n = 5, A_n = 12$$

- Green A->B
- Yellow B->A

The chance is:

$$= \frac{5}{12} * \frac{3}{10} = \frac{1}{8}$$

$$n = 2, A_n = 9$$

- Red A->B
- Green B->A

The chance is:

$$= \frac{4}{9} * \frac{1}{10} = \frac{4}{90}$$

Therefore, the total chance is:

$$= \frac{1}{8} + \frac{4}{90} = 0.1694 = 16.9\%$$