

Probability Book 2

ROB OLLIS

Edition 1



Probability



Question 1

It is known from experience that 90% of the eggs from a certain farm are fresh. If a cook chooses 3 of these eggs, what is the probability:

- (a) That all 3 are fresh
- (b) That at least one is stale

Question 2

A man has four pairs of socks, each pair a different style. If he selects two socks at random, what is the probability that they form a matching pair?

Question 3

(i) Comment briefly on the following, giving reasons for your view: “There are 12 teams in a football competition. The probability that a particular team will win that competition is $1/12$ ”

(ii) One hundred tickets are to be sold in a raffle. Two different tickets are to be drawn out for first and second prizes respectively. A man buys ten tickets. Find the probabilities that:

- (a) he wins the first prize.
- (b) he wins both prizes
- (c) he wins neither prize
- (d) he wins at least one prize.

Question 4

In a certain school the senior students are divided into two classes A and B. Class A contains 11 female and 9 male students and class B contains 8 female and 12 male students. A certain occasion requires two speakers, one from each class. These are selected at random. Find the probabilities that:

- (a) both speakers are male
- (b) both speakers are female
- (c) one speaker is male and one is female.

Question 5

An urn contains 4 black and 3 white balls. Two balls are drawn at random and placed in a hat. What is the probability that the hat contains:

- (a) two white balls
- (b) a white and a black ball.

(ii) In a certain strain of plant the probability that a seed will produce a pink flower is $1/4$. Determine the least number of seeds that must be planted in order that the probability of obtaining at least one pink flower exceeds 0.99.

Probability



Question 2 $\frac{1}{7}$

Question 3 (i) This is not a true statement because winning is not a random event.
The teams are not of equal ability, and in fact players get injured or suspended or transferred etc.

(ii) **a** $\Pr(\text{he wins the first prize}) = P(1\text{st}) = \frac{10}{100} = \frac{1}{10}$
b $\Pr(\text{he wins both prizes}) = \Pr(1\text{st} \& 2\text{nd}) = \frac{10}{100} \times \frac{9}{99} = \frac{1}{110}$
c $\Pr(\text{he wins neither prize}) = \Pr(F \& F) = \frac{90}{100} \times \frac{89}{99} = \frac{89}{110}$
d $\Pr(\text{he wins at least one prize}) = 1 - \Pr(\text{no prize}) = 1 - \frac{89}{110} = \frac{21}{110}$

Question 4

a $\Pr(\text{both speakers are male}) = P(M \& M) = \frac{9}{20} \times \frac{12}{20} = \frac{27}{100}$
b $\Pr(\text{both speakers are female}) = P(F \& F) = \frac{11}{20} \times \frac{8}{20} = \frac{22}{100}$
c $\Pr(\text{one male and one female}) = 1 - [P(M \& M) + P(F \& F)] = 1 - \left(\frac{27}{100} + \frac{22}{100}\right) = \frac{51}{100}$

Question 5 (i) (a) $\frac{3}{7} \times \frac{2}{6} = \frac{1}{7}$ (b) $\frac{4}{7}$ (ii) $1 - \left(\frac{3}{4}\right)^n > 0.99, n = 17$

Question 6

(i) **a** $\frac{1}{36}$ **b** $\frac{1}{18}$ **c** $\frac{11}{36}$ **d** $\frac{5}{36}$ (ii) $1 - 0.1 \times 0.2 = 0.98$

Question 7

(a) $\Pr \text{ first prize} = \frac{2}{53}$ (b) both prizes $\frac{2}{53} \times \frac{1}{52} = \frac{1}{1378}$ (c) not win a prize $= \frac{51}{53} \times \frac{50}{51} = \frac{50}{53}$

Question 8 (a) $\frac{7}{12}$ (b) $\frac{1}{6}$

Question 9 (a) $1 \times 10 \times 10 \times 1 = 100$ (b) $\Pr = \frac{1}{19}$

Question 10 $\Pr = \frac{3}{16}$

Question 11 $\Pr = 0.04$

Question 12 (a) (i) $\frac{11}{36}$ (ii) $\frac{1}{9}$ (b) $\Pr(\text{sum} \geq 41) = \frac{7}{36^2}$

Question 13 (a) $\frac{1}{114}$ (b) $\frac{91}{192}$ (c) $\frac{101}{192}$ (d) $\frac{35}{76}$

Question 14 (i) $\Pr(S > 8) = \frac{5}{18}$ (ii) $\Pr(S > 8) = \frac{4}{11}$

Question 15 (a) $\frac{3}{14}$ (b) $\frac{2}{7}$ (c) $\frac{11}{14}$ (d) $\frac{3}{11}$

Question 16 (a) 0.027 (b) 0.343 (c) $1 - 0.343 = .657$ (d) $0.441 + 0.343 = 0.784$

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At the coaching session:

1. Smile, relax, you are focused and in control
2. Concentrate, visualize, execute: claim the reward
3. Assume success. Our members should approach each test in life enthusiastically; every challenge presents an opportunity to demonstrate your prowess. Relish but don't underestimate the magnitude of the test, instead focus your thoughts towards a positive outcome, a chance to excel; a time to enjoy your moment in the sun.

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- show care and give encouragement to you in your striving for excellence
- to personalise all our efforts to your specific needs in all areas
- to encourage you to dare to dream, and to expect that dreams do come true

Christian Avent

CHRISTIAN AVENT

B.Ed. NCAS Principal

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- to appreciate my cohorts and support them in any way possible
- to live the dream, strive for excellence in everything that I do
- visualise my ultimate success

Robert A Ollis

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