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1. In Finland, you can buy so-called Ässä-arpa, which is a lottery ticked that costs **4 euros**. The amount of printed lottery tickets is $3\,000\,000$ and the winnings (Euros) and their numbers (N) are the following:

Euros	N
$100\,000$	5
$2\,000$	40
$1\,000$	160
500	$1\,000$
30	$16\,000$
20	$80\,000$
10	$180\,000$
5	$240\,000$
4	$250\,000$

What is the the **expected net win** in the case of buying one ticket?

2. It is known that in Italian main soccer league *Serie A*, the average number of goals per a soccer match is 2.63. If you consider a random soccer match in Serie A, what are the probabilities that there are totally:

(a) Zero goals?
(b) One goal?
(c) Two goals?
(d) Three goals?
(e) Four goals?
(f) Five goals or more?

3. A safety engineer feels that 35% of all industrial accidents in her plant are caused by failure of employees to follow instructions. She decides to read carefully the accident reports (selected randomly and replaced in the pile after reading) until she finds one that shows an accident caused by failure of employees to follow instructions.

(a) On average, how many reports would the safety engineer expect to look at until she finds a report showing an accident caused by employee failure to follow instructions?
(b) What is the probability that the safety engineer will have to examine at least three reports until she finds a report showing an accident caused by employee failure to follow instructions?

4. Consider two discrete random variables X and Y. We say that X and Y are **independent** if

$$P(X = x, Y = y) = P(X = x) \times P(Y = y).$$

In other words, if two random variables are independent, then we can multiply their mass functions to get the mass function of the combination of the two.

Let the random variable X be the number of goals of the home team scores at home. Similarly, let Y be the number of goals that the away team scores at away. Let us also assume that both X and Y are following the Poisson distribution and that the variables X and Y are independent.

Consider the Tottenham vs Norwich City match (Tottenham is the home team). We have estimated from the historical data that in this match:

$$\lambda_{\text{Tottenham}} = 2.3 \quad \text{and} \quad \lambda_{\text{Norwich}} = 0.7.$$

Compute the following probabilities:

(a) Match ends 1–0
(b) Match ends 2–0
(c) Match ends 2–1
(d) Match ends in a draw (both teams have the same number of scores).

5. An agent sells life insurance policies to **five** equally aged, healthy people. According to recent data, the probability of a person living in these conditions for 30 years or more is 0.6. Calculate the probability that after 30 years:

(a) All five people are still living.
(b) At least three people are still living.
(c) Exactly two people are still living.