

IBHL Maths Semester Two Homework One

All of these problems are calculator-friendly problems

1. There are 25 disks in a bag. Some of them are black and the rest are white. Two are simultaneously selected at random. Given that the probability of selecting two disks of the same colour is equal to the probability of selecting two disks of different colour, how many black disks are in the bag?

2. In a game a player pays an entrance fee of \$ n . He then selects one number from 1, 2, 3, 4, 5, 6 and rolls three standard dice.

If his chosen number appears on all three dice he wins four times his entrance fee.

If his number appears on exactly two of the dice he wins three times the entrance fee.

If his number appears on exactly one die he wins twice the entrance fee.

If his number does not appear on any of the dice he wins nothing.

(a) Copy and complete the probability table below

Profit (\$)	$-n$	n	$2n$	$3n$
Probability		$\frac{75}{216}$		

(b) Show that the player's expected profit is $\left(\frac{-17n}{216}\right)$

(c) What should the entrance fee be so that the player's expected loss per game is 34 cents?

3. In an examination of 20 multiple-choice questions each question has four possible answers, only one of which is correct. Skippy randomly guesses the answer to each question.

(a) Find the expected number of correct answers.

(b) Find the probability that Skippy obtains this expected number of correct answers.

4. In a rental property business, the profits in Euros per year for 50 properties are shown in the following cumulative table. [Hint: you need mid-class values]

Profit (x)	Number of properties with profit less than x
- 10000	0
- 5000	3
0	7
5000	22
10000	39
15000	44
20000	50

For this population of 50 properties, calculate an estimate for the standard deviation of the profit.

5.

A discrete random variable X has its probability distribution given by

$$P(X = x) = k(x+1), \text{ where } x \text{ is } 0, 1, 2, 3, 4.$$

(a) Show that $k = \frac{1}{15}$.

(b) Find $E(X)$.

Please show all working [set-ups] and use standard IB mathematical notation. Remember that our notes are online and that you can also consult your textbook.