

Assignment : Binomial distribution

Date _____

1. Jan plays a game where she tosses two fair six-sided dice. She wins a prize if the sum of her scores is 5.
 - (a) Jan tosses the two dice once. Find the probability that she wins a prize.
 - (b) Jan tosses the two dice 8 times. Find the probability that she wins 3 prizes.
2. A multiple choice test consists of ten questions. Each question has five answers. Only one of the answers is correct. For each question, Jose randomly chooses one of the five answers.
 - (a) Find the expected number of questions Jose answers correctly.
 - (b) Find the probability that Jose answers exactly three questions correctly.
 - (c) Find the probability that Jose answers more than three questions correctly.
3. A box holds 240 eggs. The probability that an egg is brown is 0.05.
 - (a) Find the expected number of brown eggs in the box.
 - (b) Find the probability that there are 15 brown eggs in the box.
 - (c) Find the probability that there are at least 10 brown eggs in the box.
4. A factory makes switches. The probability that a switch is defective is 0.04. The factory tests a random sample of 100 switches.
 - (a) Find the mean number of defective switches in the sample.
 - (b) Find the probability that there are exactly six defective switches in the sample.
 - (c) Find the probability that there is at least one defective switch in the sample.
5. The probability of obtaining heads on a biased coin is 0.18. The coin is tossed seven times.
 - (a) Find the probability of obtaining **exactly** two heads.
 - (b) Find the probability of obtaining **at least** two heads.
6. A factory makes calculators. Over a long period, 2 % of them are found to be faulty. A random sample of 100 calculators is tested.
 - (a) Write down the expected number of faulty calculators in the sample.
 - (b) Find the probability that three calculators are faulty.
 - (c) Find the probability that more than one calculator is faulty.
7. A box contains 35 red discs and 5 black discs. A disc is selected at random and its colour noted. The disc is then replaced in the box.
 - (a) In eight such selections, what is the probability that a black disc is selected
 - (i) exactly once?
 - (ii) at least once?
 - (b) The process of selecting and replacing is carried out 400 times.
What is the expected number of black discs that would be drawn?

Answer to assignment Binomial distribution

1. (a)

$$\frac{4}{36} \binom{1}{9}$$

(b) 0.0426

2. (a) $E(X) = 2$

(b) 0.201

(c) 0.121

3. (a) 12

(b) 0.0733

(c) 0.764

4. (a) 4

(b) 0.105

(c) 0.983

5. (a) 0.252

(b) 0.368

6. (a) 2

(b) 0.182

(c) 0.597

0.323

7.

(a) (i) 0.393 to 3 sf

(ii) 0.656

(b) 50

