

QQQ – Further Statistics 1 – Chapter 3 – Geometric and Negative Binomial Distributions (Version 2)

Total Marks: 25

(25 = Platinum, 23 = Gold, 20 = Silver, 17 = Bronze)

1. A spinner can land on red or blue. When the spinner is spun, there is a probability of $\frac{1}{3}$ that it lands on blue. The spinner is spun repeatedly.

The random variable B represents the number of the spin when the spinner first lands on blue.

(a) Find

(i) $P(B = 4)$

(ii) $P(B \leq 5)$

(4)

(b) Find $E(B^2)$

(3)

Steve invites Tamara to play a game with this spinner.

Tamara must choose a colour, either red or blue.

Steve will spin the spinner repeatedly until the spinner first lands on the colour Tamara has chosen. The random variable X represents the number of the spin when this occurs.

If Tamara chooses red, her score is e^X

If Tamara chooses blue, her score is X^2

(c) State, giving your reasons and showing any calculations you have made, which colour you would recommend that Tamara chooses. (5)

(Total 12 marks)

2. In a game a spinner is spun repeatedly. When the spinner is spun, the probability of it landing on blue is 0.11

(a) Find the probability that the spinner lands on blue

(i) for the first time on the 6th spin, **(2)**

(ii) for the first time before the 6th spin, **(2)**

(iii) exactly 4 times during the first 6 spins, **(2)**

(iv) for the 4th time on or before the 6th spin. **(4)**

Zac and Izana play the game. They take turns to spin the spinner. The winner is the first one to have the spinner land on blue. Izana spins the spinner first.

(b) Show that the probability of Zac winning is 0.471 to 3 significant figures. **(3)**

(Total 13 marks)