

QQQ – Further Statistics 1 – Chapter 5 – Central Limit Theorem (Version 2)

Total Marks: 22

(22 = Platinum, 20 = Gold, 18 = Silver, 15 = Bronze)

1. A sample of size 5 is taken from a population that is normally distributed with mean 10 and standard deviation 3. Find the probability that the sample mean lies between 7 and 10. **(6)**

(Total 6 marks)

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2. There are 32 students in a class.

Each student rolls a fair die repeatedly, stopping when their total number of sixes is 4

Each student records the total number of times they rolled the die.

- Estimate the probability that the mean number of rolls for the class is less than 27.2 **(6)**

(Total 6 marks)

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3. A football team scores goals at an average rate of 1.8 goals per match.

- (a) Give two assumptions that would be necessary to use a Poisson distribution to model the number of goals scored in a match by the team. **(2)**

Given that in their next match the team scores exactly 3 goals,

- (b) find the exact probability that 2 of these goals were scored in the first half of the match. **(4)**

A hockey team plays 2 games each week during a 40-week season.

Each game consists of 2 periods.

The probability that the team concedes no goals in a period is 0.55

The random variable X represents the number of **periods** in a week in which the team concedes no goals.

- (c) (i) Write down a suitable distribution for X
- (ii) For this 40-week season, use the Central Limit Theorem to estimate $P(\bar{X} > 2)$ **(4)**

(Total 10 marks)

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