MA4413 Mid Term 2 Sample Paper

Q1. Theory for Inference Procedures (4 Marks)

Answer the four short questions. Each correct answer will be awarded 1 mark.

(i) (1 Mark) What is a $p-$value?

(ii) (1 Mark) Briefly describe how $p-$value is used in hypothesis testing

(iii) (1 Mark) What is meant by a Type I error?

(iv) (1 Mark) What is meant by a Type II error?

Q2. Normal Distribution (5 Marks)

An analogue signal received at a detector (measured in microvolts), is normally distributed with a mean of 100 microvolts and a standard deviation of 25 microvolts.

(i) (1 Mark) What is the Z-score for 137.5 microvolts?

(ii) (1 Mark) What is the Z-score for 80 microvolts?

(iii) (1 Mark) What is the probability that the signal will exceed 137.5 microvolts?

(iv) (1 Mark) What is the probability that the signal will be less than 80 microvolts?

(v) (1 Mark) What is the probability that the signal will be between 80 and 125 microvolts?

Q3. Inference Procedures (6 Marks)

Part A: A sample of 200 voters was taken by a political pollster to estimate the proportion of first preference votes a particular candidate will obtain in a forthcoming election. It was found that 110 out of these 200 voters would give the candidate their first preference.

(i) (1 Mark) State the point estimate that would be used in an inference procedure.

(ii) (1 Mark) Compute the standard error that would correspond to the point estimate you have computed.

(iii) (1 Mark) Determine the 95% confidence interval for your point estimate.

Part B: Using a significance level of 5%, test the hypothesis that the percentage of voters who will give this particular candidate their first preference in the election is 60%.

(i) (1 Mark) Formally state the null and alternative hypotheses.

(ii) (1 Mark) Compute the Test Statistic for this hypothesis test.

(iii) (1 Mark) Given that the critical value is 1.96, state your conclusion for this test.