

## Do not write in this margin Question 24

The numbers of accidents experienced over a period of time by a sample of 414 machinists was recorded. On the assumption that the resulting data come from a Poisson distribution, a 90% confidence interval (0.428, 0.543) was calculated for the population mean.

(a) Briefly explain what the '90%' means in this context.

If a large number of samples were taken, approximately 90% percent of them would contain the true value of the mean.

(b) Using the above information, perform a test of the hypothesis that the population mean is equal to 0.45.

[4]

$$H_0: p = 0.45$$

$$H_1: p \neq 0.45$$

using the normal approximation

$$0.428 = \hat{p} - 1.645 \sqrt{\frac{\hat{p}}{414}}$$

$$0.543 = \hat{p} + 1.645 \sqrt{\frac{\hat{p}}{414}}$$

$$\hat{p} = 0.5058$$

$$V(\hat{p}) = 0.5058 \times 0.4942 = 0.2529$$

$$T(413) = \frac{0.5058 - 0.45}{\sqrt{0.2529}} = 1.596$$

$$T \sim N(1.596, 1.863) \quad \bar{x} = 1.863231$$

## Question 25

In an investigation into the variation of IQ scores in a large population, assuming a normal model, a 90% confidence interval for the variance was found to be (13.8, 18.6). Write down the corresponding confidence interval for the standard deviation.

[1]

$$(3.71, 4.31)$$