Test - Statistical inference

Year: University Year 1 · Duration: 60 minutes · /20

Name:	Date:	**Mark: /20**

Question	1	2	3	4	5	Total
marks	4	4	4	4	4	**20**
Mark						

Show your working.

Question 1 (4 marks)

Question 1 – A confidence interval

A sample of 50 commuting times has $\bar{x} = 31.2$ minutes and $s = 4.5$ minutes.

a. Find a 95% confidence interval for the mean commuting time. (3 marks)
b. Explain what "95% confidence" means. (1 mark)

Question 2 (4 marks)

Question 2 – A z-test

Exam marks have $\sigma = 10$. A school claims its mean is 75. A sample of 40 students has mean 78.5. Test $H_0 : \mu = 75$ against $H_1 : \mu \neq 75$ at 5%.

Question 3 (4 marks)

Question 3 – A t-test

A normal sample of 9 values has $\bar{x} = 10.8$ and $s = 1.2$. Test $H_0 : \mu = 10$ against $H_1 : \mu > 10$ at 5%.

Question 4 (4 marks)

Question 4 – A test of independence

The table shows whether 120 students passed a test, by whether they attended a revision session.

	Passed	Failed
Attended	40	20
Did not attend	30	30

a. Find the expected frequencies. (1 mark)
b. Calculate χ^2 (without continuity correction) and test at 5%. (3 marks)

Question 5 (4 marks)

Question 5 – Problem: regression

For 8 pairs, $\sum x = 40$, $\sum y = 96$, $S_{xx} = 42$ and $S_{xy} = 63$.

a. Find the regression line of y on x. (2 marks)
b. Predict y at $x = 6$ and comment on a prediction at $x = 20$ when the x values lie between 1 and 9. (2 marks)