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A survey during 2013 investigated mean expenditure on bread and on alcohol.

The 2013 survey obtained information from 12 144 adults.

The survey revealed that the mean expenditure per adult per week on bread was 127p.
- 14 (a)

For 2012, it is known that the expenditure per adult per week on bread had mean 123p, and a standard deviation of 70p.
- 14 (a) (i)

Carry out a hypothesis test, at the 5% significance level, to investigate whether the mean expenditure per adult per week on bread changed from 2012 to 2013.

Assume that the survey data is a random sample taken from a normal distribution.

[5 marks]
- 14 (a) (ii)

Calculate the greatest and least values for the sample mean expenditure on bread per adult per week for 2013 that would have resulted in acceptance of the null hypothesis for the test you carried out in part (a)(i).

Give your answers to two decimal places.

[2 marks]
- 14 (b)

The 2013 survey revealed that the mean expenditure per adult, per week on alcohol was 324p.

The mean expenditure per adult per week on alcohol for 2009 was 307p.

A test was carried out on the following hypotheses relating to mean expenditure per adult per week on alcohol in 2013.

$H_0 : \mu = 307$

$H_1 : \mu \neq 307$

This test resulted in the null hypothesis, H_0 , being rejected.

State, with a reason, whether the test result supports the following statements:
- 14 (b) (i)

the mean UK expenditure on alcohol per adult per week increased by 17p from 2009 to 2013;

[2 marks]
- 14 (b) (ii)

the mean UK consumption of alcohol per adult per week changed from 2009 to 2013.

[2 marks]