

## Statistics (ABC260S) Test 2

Qualification Name	Diploma in Stuff	Qualification Code	D3STUF
Examiner	Mr E Fudd	Date	26 November 2025
Examiner's Department	Mathematics & Physics	Time	09h00 – 11h00
Internal Moderator	Ms M Mouse	Duration	Two Hours
Total Pages	4	Total Marks	38
<b>Instructions</b> <ul style="list-style-type: none"><li>• You must answer all questions. You may answer the questions in any order.</li><li>• All answers must be written in the answer booklet provided, not on the question paper.</li><li>• Show all steps and not only the final answer.</li><li>• Numerical answers may be expressed as fractions in lowest terms or decimals correct to four significant digits.</li></ul>			

## Useful Formulas

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$$\Pr(a \leq X \leq b) = \int_a^b f_X(x) dx$$

$$\Pr(a \leq X \leq b) = F_X(b) - F_X(a)$$

$$F_X(x) = \Pr(X \leq x) = \int_{-\infty}^x f_X(t) dt \text{ for } -\infty < x < \infty$$

$$f_X(x) = \frac{dF_X(x)}{dx}$$

## Questions

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1. [10 marks] Answer the following multiple choice questions (two marks each).

a. [2 marks] What is the capital city of Viet Nam?

- i. Hanoi
- ii. Lome
- iii. Kingstown
- iv. Panama

b. [2 marks] What is the deepest lake in the world?

- i. Matano
- ii. Kivu
- iii. Sarez
- iv. Baikal

c. [2 marks] What is  $4 + 10$ ?

- i. 16
- ii. 30
- iii. 11
- iv. 14

d. [2 marks] Which of the below capital cities is furthest south?

- i. Minsk
- ii. Bucuresti
- iii. Gaborone
- iv. Chisinau

2. [11 marks] Below are given the final marks of a class of fifteen students.

40 57 31 84 37 58 43 54 71 40 83 61 70 72 29

- a. [3 marks] Find the mean of the final marks.
- b. [3 marks] Find the median of the final marks.
- c. [3 marks] Find the standard deviation of the final marks.
- d. [2 marks] Draw a histogram of the final marks. Use a bin width of 10.

3. [9 marks] Consider the random variable  $X$  with probability density function as follows:

$$f_X(x) = \begin{cases} k(6x + 6x^2) & \text{for } 0 \leq x \leq 3 \\ 0 & \text{otherwise} \end{cases}$$

- a. [3 marks] Find the value of  $k$ .
  - b. [3 marks] Find  $\Pr(X < 1)$ .
  - c. [3 marks] Show the probability just calculated on a graph of  $f_X(x)$ .
4. [8 marks] Consider the dataset provided in the Excel file `surf4cars_Toyota_Corolla.xlsx`. A description of the columns in the dataset is as follows. Answer the following questions using R code and output only.
- a. [4 marks] Fit a linear regression model to the data where Asking Price is the response variable and EngineSize and YearModel are explanatory variables. Display a summary of the model output.
  - b. [4 marks] Predict the asking price of a Toyota Corolla with a Engine Size (l) value of 1.8 and a Year of Manufacture value of 2021. Include 95% prediction limits.