Instructions for Section A

Answer **all** questions in pencil on the answer sheet provided for multiple choice questions.

Choose the response that is **correct** for the question.

A correct answer scores 1; an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Data Analysis

Use the following information to answer Questions 1 to 3.

The heights of a population of year 12 students are normally distributed with a mean of 170 cm and a standard deviation of 5 cm.

Question 1

A student selected at random from this population has a standardised height of -2.5 cm. The student's actual height rounded to the nearest cm is:

A.   182

B.   157

C.   183

D.   158

E.   170

Question 2

Another student is a randomly selected from this population and has a standardised height of 1 cm. The percentage of students who are shorter than this student would be closest to:

A.   16 %

B.   84 %

C.   68 %

D.   50 %

E.   32 %

Question 3

A sample of 300 students was selected from this population. The number of students to measure between the heights of 165cm and 180cm is closest to:

A.   245

B.   204

C.   285

D.   150

E.   55

TEXAS INSTRUMENTS

Use the following information to answer questions 4 to 6:

The scatterplot below displays the results for a group of year 12 Further Mathematics students and the time spent studying for their SAC.
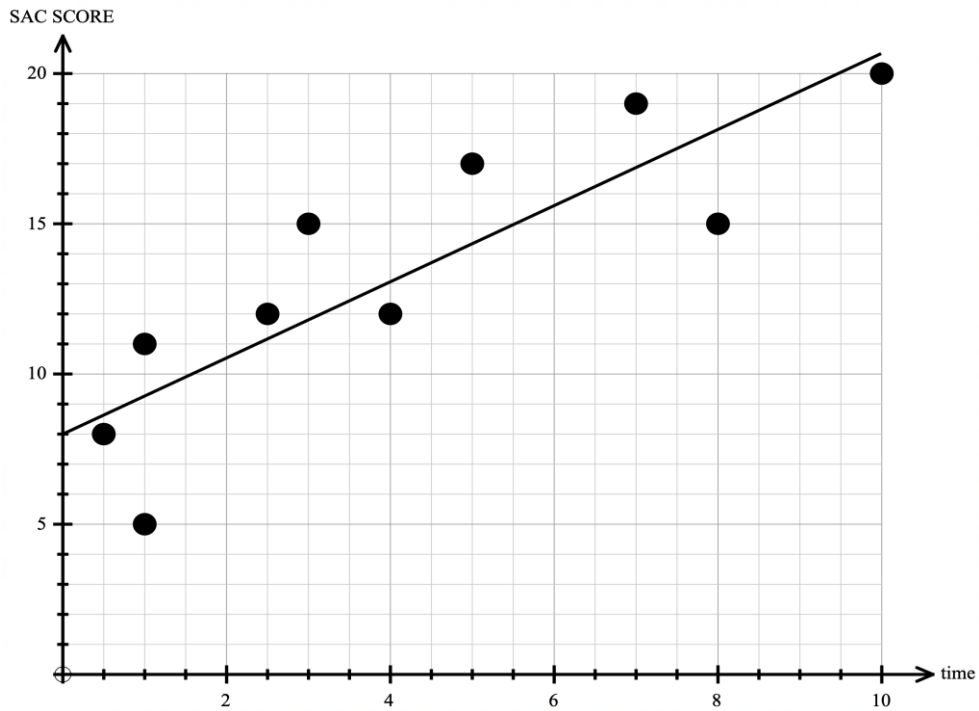
Question 4

The residual corresponding to the student who spent 3 hours studying for the SAC is closest to:

A.   15
B.   12
C.   0
D.   3
E.   -3

Question 5

The equation of the least squares line is closest to:

A.   SAC SCORE = 8 + 1.3 X TIME
B.   SAC SCORE = 8 - 1.3 X TIME
C.   SAC SCORE = 1.3 + 8 X TIME
D.   TIME = 8 + 1.3 X SAC SCORE
E.   TIME = 8 - 1.3 X SAC SCORE

Question 6

The coefficient of determination is 0.726. The correlation coefficient, r, is closest to:

A.   -0.85
B.   0.85
C.   -0.726
D.   85 %
E.   0

The following information is to be used for questions 7 and 8.

A set of experimental data is recorded in the following table:

x	1	2	3	4	5	6	7	8	9	10
y	106	49	35	24	19	16	13	13	8	8

Question 7

To linearise the data, a reciprocal transformation to the y variable is performed. A least squares regression line is then fitted to the transformed data; with x being the explanatory variable. The equation of this least squares line is closest to:

A. $\frac{1}{y} = 72.9 - 7.96x$

B. $y = 72.9 - 7.96x$

C. $y = -0.009 + 0.013\frac{1}{x}$

D. $y = -0.009 + 0.013x$

E. $\frac{1}{y} = -0.009 + 0.013x$

Question 8

Using this equation, the predicted value of y when x = 5 is closest to:

A. 18
B. 17
C. 31
D. -31
E. 16

Question 9

The statistical analysis of a set of bivariate data involving the variables x and y is displayed in the following table:

Mean of x	28.1
Mean of y	33.0
Standard deviation of x	2.11
Standard deviation of y	3.22
Equation of the least squares line	$y = -2.81 + 1.52x$

Using this information, the value of the correlation coefficient, r, for this set of bivariate data is closest to:

A. 1.841
B. -0.996
C. 0.996
D. 0.841
E. 0.992

Use the following information to answer Questions 10 and 11.

The table below shows the number of ice creams sold in a shop over a 9 week period:

Week	1	2	3	4	5	6	7	8	9
Number of ice-creams	289	197	240	245	465	345	282	267	234

Question 10

Using four mean smoothing with centring the *smoothed* number of ice creams sold for week 5 is closest to:

A.   337

B.   306

C.   329

D.   282

E.   380

Question 11

Using three mean smoothing, the *smoothed* number of ice creams sold for week 3 is closest to:

A.   242

B.   227

C.   317

D.   245

E.   240

Question 12

The quarterly sales figures for a business, in millions of dollars in 2017 and 2018 are displayed in the table below:

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2017	1.74	2.88	3.35	1.24
2018	1.04	2.46	2.06	0.78

Using these sales figures, the seasonal index for quarter 2 is closest to:

A.   1.3

B.   1.6

C.   1.4

D.   0.5

E.   1.7

Recursion and financial modelling

Use the following information to answer Questions 13 and 14.

The value of an annuity investment where interest is paid monthly and payments are also made monthly can be modelled by the following recurrence relation:

$$V_0 = 56\ 000 \qquad V_{n+1} = 1.0043\ V_n + 500$$

Question 13

The value of the annuity after three months is:

A. $57 484
B. $56 000
C. $57 500
D. $58 982
E. $58 232

Question 14

The increase in the value of the annuity between the third and fourth year is closest to:

A. $500
B. $750
C. $250
D. $747
E. $754

Use the following information to answer Questions 15 to 17.

A car is purchased for $35,000. Over time its value depreciates using the reducing balance method. The car's value depreciates at a rate of 7.1% each year.

Question 15

The recurrence relationship that models the depreciation of this car would be:

A. $V_0 = 35\ 000$ $V_{n+1} = 0.929\ V_n$
B. $V_0 = 35\ 000$ $V_{n+1} = 1.071\ V_n$
C. $V_0 = 35\ 000$ $V_{n+1} = 7.1\ V_n$
D. $V_0 = 35\ 000$ $V_{n+1} = 1.71\ V_n$
E. $V_0 = 35\ 000$ $V_{n+1} = 1.929\ V_n$

Question 16

The value of the car after 5 years is closest to:

A. $49 319
B. $35 000
C. $26 069
D. $24 219
E. $24 499

Question 17

The depreciation of the car during the 5th year is closest to:

A. $10 782
B. $1720
C. $2000
D. $1992
E. $1851

Use the following information to answer Questions 18 to 20.

Jane borrows $250,000 to purchase a house. To pay this loan off she makes monthly payments, the interest rate for the loan is 3.5% per annum compounding monthly. Jane wishes to pay the loan off in 25 years.

Question 18

The monthly repayment that Jane has to make will be closest to:

A. $1251
B. $1252
C. $8750
D. $8751
E. $2360

Question 19

The balance of the loan after 10 years is closest to:

A. $538 059
B. $622 127
C. $175 009
D. $145 000
E. $189 395

Question 20

After 10 years the interest rate changes to 3.4% per annum. The new payment that Jane has to make each month is closest to:

A. $1 243
B. $1 245
C. $1 300
D. $1 234
E. $1 233