Student Name: _____

FURTHER MATHEMATICS

Units 3 & 4 – Written examination 1

2009 Trial Examination

Reading time: 15 minutes
Writing time: 1 hour and 30 minutes

MULTIPLE CHOICE QUESTION BOOK

Structure of book

Section	*Number of questions*	*Number of questions to be answered*	*Number of modules*	*Number of modules to be answered*	*Number of marks*
A	13	13			13
B	54	27	6	3	27
					Total 40

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers, one bound reference, one approved graphics calculator or approved CAS calculator or CAS software and, if desired, one scientific calculator. Calculator memory DOES NOT need to be cleared.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.

Materials supplied

- Question book of 32 pages.

Instructions

- Print your name in the space provided on the top of this page.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic communication devices into the examination room.

SECTION A

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.

CORE – Data Analysis

Question 1

Statistical analysis of a set of 20 data values found that; $\bar{x} = 56.2, \bar{y} = 22.1, s_x = 3.18, s_y = 2.15$ and r = 0.86. The equation of the line of best fit for this data set is

A. $y = 0.58 - 10.58x$

B. $y = 0.58x - 10.58$

C. $y = 1.72 - 74.56x$

D. $y = -74.56 - 1.72x$

E. $y = 74.56 - 1.72x$

The following information relates to Questions 2, 3 and 4

The back-to-back stemplot shows the distribution of scores of 25 randomly selected golfers in the final round of the St Andrews and Pebble Beach tournaments.

St Andrews		Pebble Beach
	5	9
0 0 1 2 2 3 6 6 8	6	0 0 2 5 5 6 8 8
0 0 0 0 1 1 1 2 2 3 4 5 8 8 9	7	0 1 1 1 1 2 3 4 5 5 5 6
1	8	1 2 2 4

Question 2

The variables: golf course (St Andrews and Pebble Beach) and score (no. Of shots) are

A. both categorical

B. both numerical

C. discrete and continuous respectively

D. categorical and numerical respectively

E. numerical and categorical respectively

Question 3

The mean scores of the final round at St Andrews and Pebble Beach respectively were

A. 69.72 and 71.04

B. 2.92 and 3.44

C. 70 and 71

D. 21 and 25

E. 19 and 19.5

Question 4

The ranges and medians of the scores at St Andrews and Pebble Beach respectively were

A. St Andrews: range = 21, median = 70, Pebble Beach: range = 25, median = 71

B. St Andrews: range = 25, median = 70, Pebble Beach: range = 21, median = 71

C. St Andrews: range = 9, median = 2, Pebble Beach: range = 9, median = 4

D. St Andrews: range = 21, median = 71, Pebble Beach: range = 25, median = 70

E. St Andrews: range = 19, median = 70, Pebble Beach: range = 19.5, median = 71

Question 5

A student received a standardised (Z score) mark of 1.8 in a test that had an average of 62 and a standard deviation of 12.2. The student's actual mark was closest to

A. 40

B. 76

C. 64

D. 84

E. 74

Question 6

In another test the student received a standardised mark of -1.8. Assuming that the scores were normaly distributed, it can be concluded that this student's mark was

A. in the top 50% of the marks in the test

B. in the bottom 50% but not in the bottom 16% of the marks in the test

C. in the bottom 0.15% of the marks in the test

D. in the bottom 2.5% but not in the bottom 0.15% of the marks in the test

E. in the bottom 16% but not in the bottom 2.5% of the marks in the test

TURN OVER

The following information relates to Questions 7, 8 and 9

It is commonly known that the age of a tree can be determined by the number of rings in its trunk. The relationship between the height (in metres) of a species of tree and the number of rings was graphed and the equation of the least squares regression line was found to be

$$height = 0.56 + 0.72 \times number\ of\ rings$$

The correlation coefficient is $r = 0.74$.

Question 7

From the equation of the least squares regression line it can be concluded that, on average, this species of trees grows

A. 72 metres for every ring that it has in its trunk

B. 56 metres for every ring that it has in its trunk

C. 72 centimetres for every ring that it has in its trunk

D. 56 centimetres for every ring that it has in its trunk

E. 0.72 centimetres for every ring that it has in its trunk

Question 8

The correlation coefficient indicates that the relationship between the number of rings (age) and the height is

A. positive and moderate

B. negative and strong

C. negative and weak

D. positive and strong

E. positive and weak

Question 9

Based on the information it can be deduced that

A. 74% of the variation in the tree height can be explained by the number of rings.

B. 55% of the variation in the tree height can be explained by the number of rings.

C. 72% of the variation in the number of rings can be explained by the tree height.

D. 74% of the variation in the number of rings can be explained by the tree height.

E. 55% of the variation in the number of rings can be explained by the tree height.

The following information relates to Questions 10 and 11

The table below shows the monthly rainfall in a city over a year

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	12	25	36	101	85	62	121	191	102	56	42	80

Question 10

If a three mean moving average smoothing is applied to the data, the smoothed value for the month of April will be closest to

A. 85 mm

B. 101 mm

C. 61.8 mm

D. 81 mm

E. 74 mm

Question 11

If this data was used to seasonalise the data for rainfall, the seasonal index for October would be

A. 0.74

B. 0.11

C. 0.89

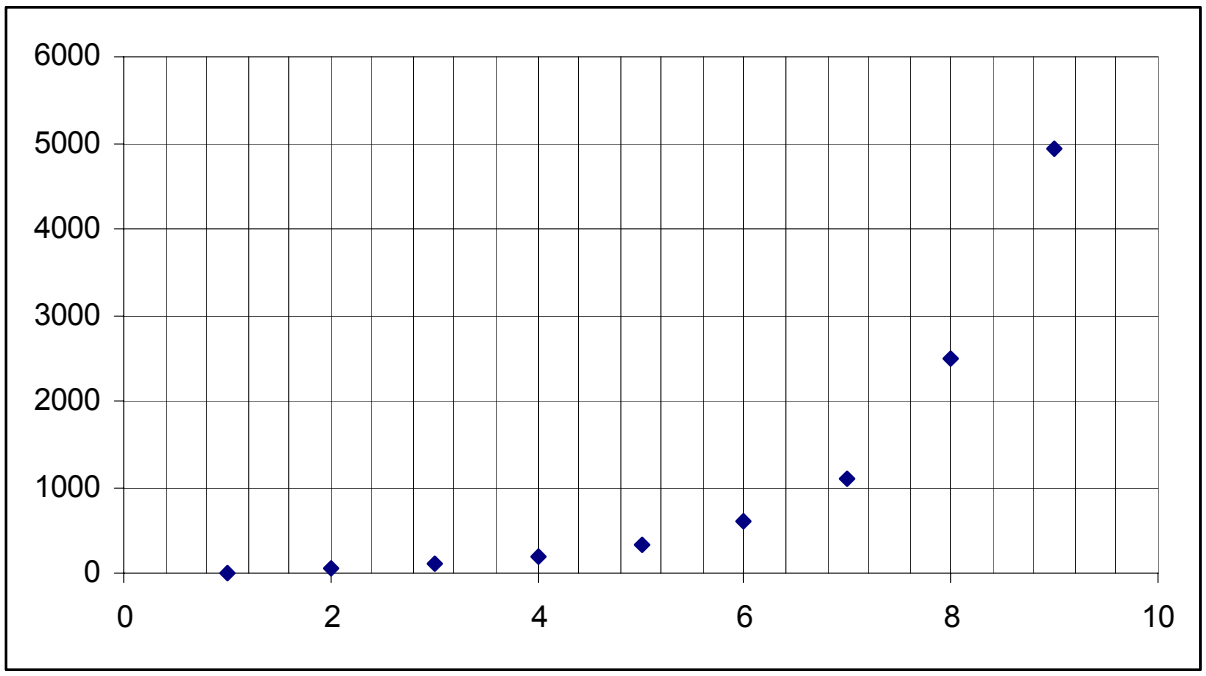
D. 1.26

E. 0.86

TURN OVER

The following information relates to Questions 12 and 13

X	1	2	3	4	5	6	7	8	9
Y	12	48	98	180	320	600	1101	2500	4920



Question 12

From the scatterplot above, a suitable transformation to linearise the data could be

A. y^2 transformation

B. $\frac{1}{x}$ transformation

C. $\frac{1}{y}$ transformation

D. $\sqrt{x}$ transformation

E. $\log x$ transformation

Question 13

A student decided to use an x^2 transformation to linearise the data. The resulting line of best fit would be closest to

A. $y^2 = -602.03 + 53.32x$

B. $y = 53.32x^2 - 602.03$

C. $y = 1.97x - 6.28$

D. $\sqrt{y} = 1.97x - 6.28$

E. $y = 1.97x^2 - 6.28$

END OF SECTION A
TURN OVER

SECTION B

Instructions for Section B

Select **three** modules and answer **all** questions within the modules selected in pencil on the answer sheet provided for multiple-choice questions.
Show the modules you are answering by shading the matching boxes on your multiple-choice answer sheet.
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.

Module 1: Number Patterns

Question 1

Which one of the following sequences shows the first five terms of an arithmetic sequence?

A. 1, 2, 3, 5, 8 …

B. 2, 8, 32, 128, 512 …

C. -4, -2, 2, 4, 6 …

D. 2, 3, 5, 9, 17 …

E. -4, -1, 2, 5, 8 …

Question 2

If the first three terms of a geometric sequence are -7, x, -63, then x is equal to

A. ± 21

B. -35

C. -3

D. 21

E. -21

Question 3

In the Lucas sequence, $t_n = t_{n-1} + t_{n-2}$. If $t_{30} = 1860498$ and $t_{32} = 4870847$, the 31st number in the Lucas sequence is

A. 1149851

B. 1860499

C. 3365673

D. 3010349

E. 6731345

TURN OVER

Question 4

The difference equation $t_{n+1} = at_n + 6$, $t_1 = 8$, generates the sequence: 8, 38, 158, 638, …

The value of *a* is

A. -4

B. 4

C. 5

D. -6

E. 6

The following information relates to Questions 5 and 6

The value of Melbourne houses has increased by 12% each year since 2005.
At the start of 2005 the median house price was $245000.

Question 5

If this trend continued the median price of houses in Melbourne at the start of 2009 would have been closest to

A. $362600

B. $344207

C. $385512

D. $392000

E. $431774

Question 6

M_n is the median price of houses in Melbourne at the start of the *n*th year.

Let $M_1 = 245000$.

The rule for a difference equation that can be used to model the median house price in Melbourne at the start of each year, assuming constant appreciation of 12%, is

A. $M_n = M_{n-1} + 0.12n$

B. $M_n = 1.12M_{n-1}$

C. $M_n = 0.88M_{n-1}$

D. $M_n = 0.12M_{n-1}$

E. $M_n = M_{n-1} + 1.12n$

Question 7

A bamboo shoot grew 60cm during the first week, 48cm during the second week and 38.4cm during the third week. If the bamboo shoot continues to grow in this manner, it will grow to a maximum height of

A. 3 metres

B. 60 centimetres

C. 75 centimetres

D. 2.4 metres

E. 1.66 metres

Question 8

The first four terms of a sequence are: 8, 12, 20, 36. The difference equation for the sequence could be

A. $t_{n+2} = t_{n+1} + t_n \qquad t_1 = 8, t_2 = 12$

B. $t_{n+1} = 1.5t_n \qquad t_1 = 8$

C. $t_{n+1} = t_n + 4n \qquad t_1 = 8$

D. $t_{n+1} = 2t_n - 4 \qquad t_1 = 8$

E. $t_{n+1} = t_n + 4 \qquad t_1 = 8$

Question 9

John started to breed mice and found that the number of mice after n months (t_n) can be modelled by the difference equation

$t_n = t_{n-1} + t_{n-2}$ where $t_1 = 2$ and $t_0 = 2$.

The number of mice that John had after 12 months is

A. 24

B. 288

C. 466

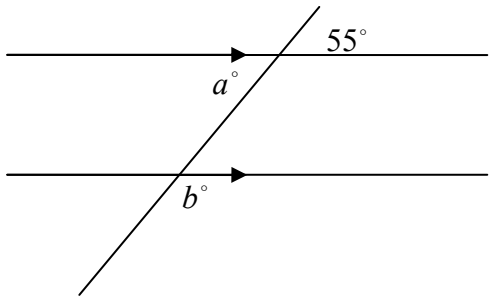
D. 1218

E. 4096

TURN OVER

Module 2: Geometry and Trigonometry

Question 1



The magnitude of angles a and b are

A. $a = 55^\circ, b = 55^\circ$

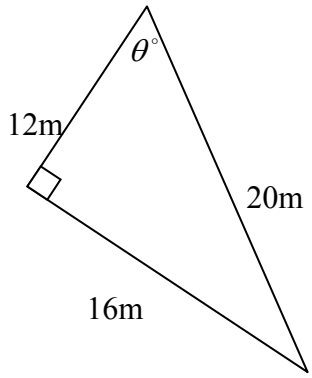
B. $a = 125^\circ, b = 125^\circ$

C. $a = 55^\circ, b = 35^\circ$

D. $a = 55^\circ, b = 125^\circ$

E. $a = 125^\circ, b = 55^\circ$

Question 2



For the triangle above the value of sinθ is closest to

A. 0.6

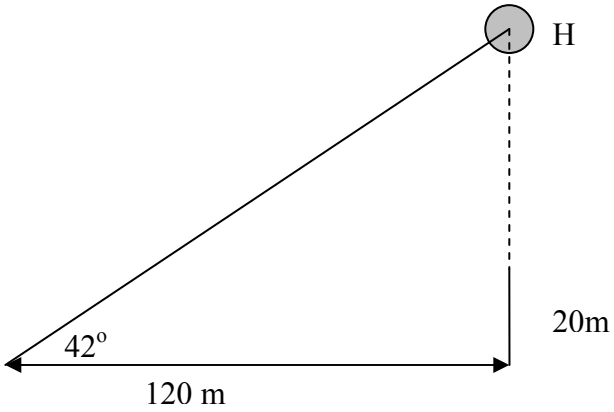
B. 0.75

C. 0.8

D. 1.25

E. 1.67

Question 3



The angle of elevation to a hot air balloon hovering over a building 120 m away is 42°. If the building is 20 m high, how far above the top of the building is the hot air balloon?

A. 100 m

B. 108.05 m

C. 88.05 m

D. 133.27 m

E. 113.27 m

Question 4

A triangular block of land has sides of 480m, 360m and 520m. The correct application of Heron's formula to calculate the area of the block is

A. $A = \frac{1}{2} \times 480 \times 360 \times 520$

B. $A = \sqrt{1360(1360-480)(1360-360)(1360-520)}$

C. $A = \sqrt{680(680-480)(680-360)(680-520)}$

D. $A = \sqrt{1360(680-480)(680-360)(680-520)}$

E. $A = \frac{1}{2} \times 480 \times \sqrt{520^2 - 360^2}$

TURN OVER

Question 5

The scale model of a new dam holds 15 litres. If the scale is 1:1750, the capacity of the dam is closest to

A. 2.63 kilolitres

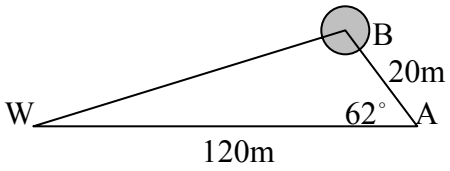
B. 45.9 megalitres

C. 5.36 gigalitres

D. 80.4 gigalitres

E. 18087.9 gigalitres

Question 6



A weather balloon that is tethered to the ground on a 20m rope has an angle of elevation of 62°. What is the distance between the weather balloon and a weather station which is 120m from the anchor point?

A. 118.32m

B. 105.95m

C. 102.77m

D. 122.42m

E. 112.01m

Question 7

A triangle ABC has side lengths $a = 25, b = 82$, and $\angle BAC = 11^\circ$. Find the magnitude of $\angle ABC$, to the nearest degree, given that it is an obtuse angle.

A. 141°

B. 140°

C. 79°

D. 39°

E. 40°

Question 8

A rectangular box has a length of 36cm, a width of 82cm and a height of 68cm. What is the length of the longest straight rod that could fit into this box, to the nearest centimetre?

A. 112 cm

B. 90 cm

C. 106 cm

D. 77 cm

E. 140 cm

Question 9

Points A and B are both 10km from point O. The bearing of A from O is 053° and the bearing of B from O is 083°. The bearing of B from A is:

A. $233^\circ T$

B. $075^\circ T$

C. $136^\circ T$

D. $158^\circ T$

E. $044^\circ T$

TURN OVER

Module 3: Graphs and Relations

Question 1

A straight line graph has a *y*-intercept of 5 and passes through the point (2, 3).The gradient of the line is

A. 5

B. 1.5

C. 1

D. -1

E. -1.5

Question 2

A solicitor's fee, *F* dollars, can be determined by the rule $F = 100 + 60n$, where n represents the number of hours worked. According to this rule that solicitor would receive

A. $220 for 3 hours work

B. $120 for 2 hours work

C. $400 for 5 hours work

D. $660 for 9 hours work

E. $500 for 6 hours work

Question 3

John makes wooden puzzles. There is a fixed cost of $50 plus a manufacturing cost of $1.20 for each puzzle. If he sells the puzzles for $4 each, what is the smallest number of puzzles John can make and sell in order to make a profit?

A. 17 puzzles

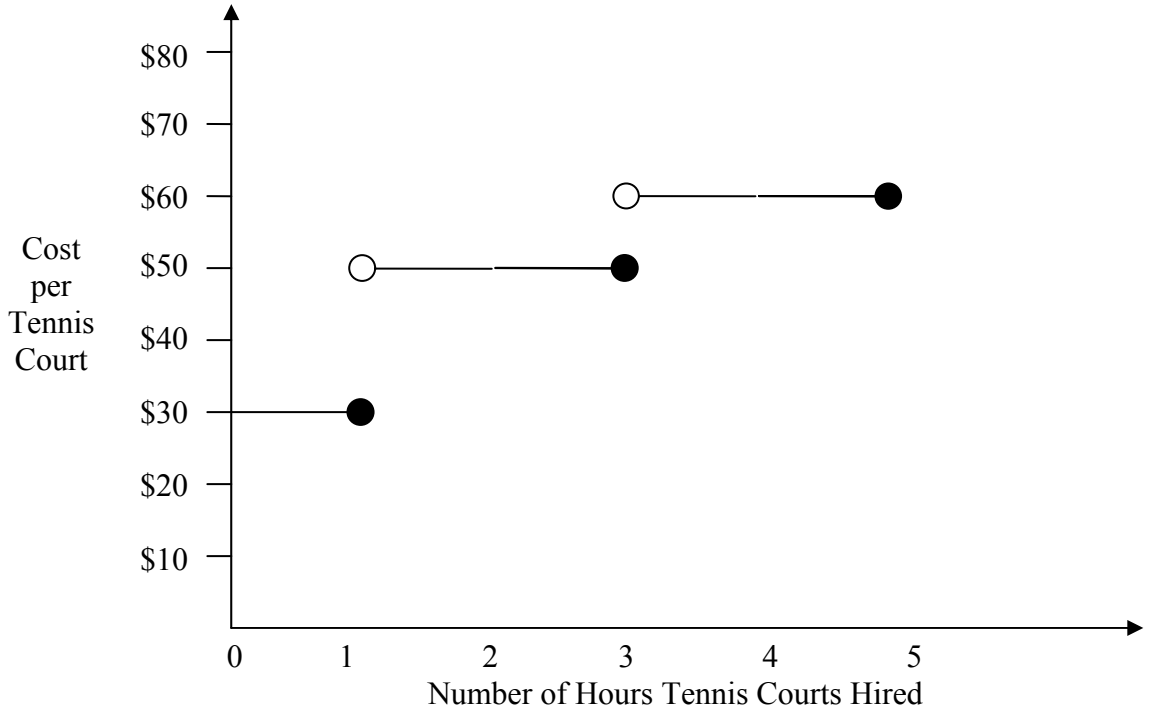
B. 18 puzzles

C. 14 puzzles

D. 10 puzzles

E. 9 puzzles

Question 4



The cost of hiring a tennis court is shown in the graph above.

A group hired two tennis courts and were charged a total of $80. The time that each court was hired for could have been

A. 1 hour and 3 hours

B. ½ an hour and 4 hours

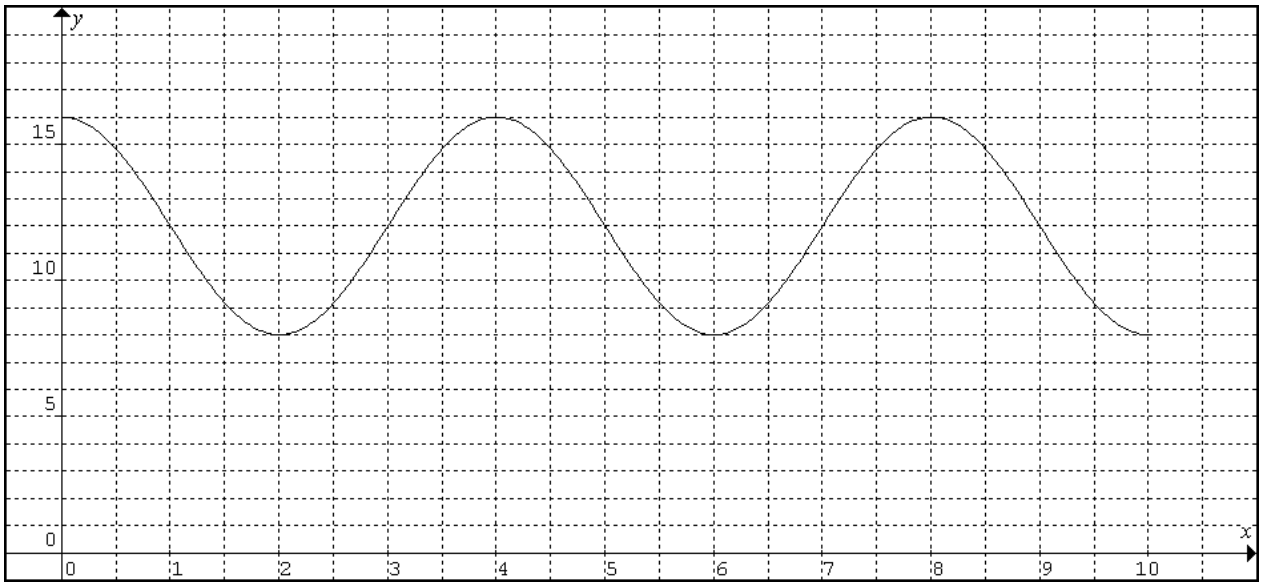
C. 2 hours and 3 hours

D. 2 hours and 4 hours

E. 1 hour and 5 hours

TURN OVER

Question 5



The height, in metres, of a dam in a hydroelectric power station is shown above. The number of times that the depth of the water is exactly 10 m is

A. 0
B. 2
C. 3
D. 4
E. 5

Question 6

Which of the following sets of simultaneous equations has no solutions?

A.
$$4x + 2y = 12$$
$$y = 2x + 10$$

B.
$$3x - 2y = 20$$
$$2x + 5y = 10$$

C.
$$2x - 6y = 30$$
$$3x + 2y = 10$$

D.
$$4x + 2y = 16$$
$$y = 9 - 2x$$

E.
$$4x + y = 16$$
$$x + y = 11$$

Question 7

Two lines intersect at the point (3, 4). Which of the following equations **could not** be one of the lines?

A. $y = 4x - 8$

B. $2x + 5y = 16$

C. $2x + 3 = 3y - 3$

D. $3x - 2y = 1$

E. $2x - 3y = -6$

Question 8

The cost of making photo frames consists of a set cost of $200 plus a production cost of $2 per frame. A company will break even if they sold

A. 200 frames at $2 each

B. 500 frames at $3 each

C. 50 frames at $6 each

D. 100 frames at $5 each

E. 300 frames at $2.50 each

Question 9

The four inequalities below were used to construct the feasible region for a problem

$$y \geq 0$$
$$x \geq 0$$
$$2x + 3y < 60$$
$$3x + 2y > 20$$

A point that lies within the feasible region is

A. (15, 10)

B. (-5, 20)

C. (4, 4)

D. (0, 15)

E. (5, 2)

TURN OVER

Module 4: Business-Related Mathematics

Question 1

A football player's agent received $48000 for obtaining a $160000 signing on fee for his client. What is the percentage of his commission?

A. 25%
B. 30%
C. 36%
D. 33%
E. 40%

Question 2

Toni bought a plasma TV for $1699, including the 10% GST. How much tax did she pay on the TV?

A. $169.90
B. $1544.55
C. $152.91
D. $154.45
E. $1529.10

Question 3

A company bought a photocopier for $22000. If it depreciates at a rate of 6 cents per copy, how many copies will it produce before it reaches its 'write off value' of $6000?

A. 266667
B. 960
C. 360667
D. 1680
E. 2667

Question 4

If Sam invested $5000 in an account earning 6% simple interest per annum, the value of the investment after 18 months will be

A. $5450
B. $450
C. $5400
D. $5540
E. $5300

Question 5

If the price of a loaf of bread was $1.95 at the end of 2006 and the inflation rate was 3.2% in 2007 and 2.4% in 2008, how much would the bread cost at the start of 2009?

A. $1.84

B. $2.05

C. $2.15

D. $2.01

E. $2.06

Question 6

Joan took out a 30 year loan of $220000 to buy a house. Find the fortnightly repayment if she pays 6.49% interest per annum.

A. $7620.48

B. $7601.51

C. $639.22

D. $640.82

E. $1860.34

Question 7

Lawrence invests $50000 in an annuity that earns interest at a rate of 4.5% per annum and pays $500 per month. How long will the annuity last, to the nearest month?

A. 126 months

B. 125 months

C. 96 months

D. 85months

E. 84 months

Question 8

If the average rate of inflation is 4.8% per annum over the next 10 years, then the buying power of $10000 in 10 years time will be closest to

A. $15981

B. $6115

C. $4800

D. $95200

E. $5200

TURN OVER

Question 9

What is the effective interest rate on a refrigerator worth $1499 and paid off with monthly instalments of $80 over 2 years?

A. 18.32%

B. 13.48%

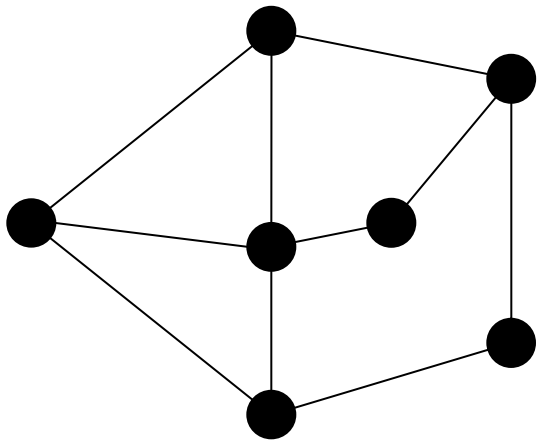
C. 14.04%

D. 26.96%

E. 28.09%

Module 5: Networks and Decision Mathematics

Question 1



In the graph above, how many vertices have an even degree?

A. 7
B. 5
C. 4
D. 3
E. 2

Question 2

How many edges are there in a complete network with 5 nodes?

A. 25
B. 10
C. 15
D. 20
E. 5

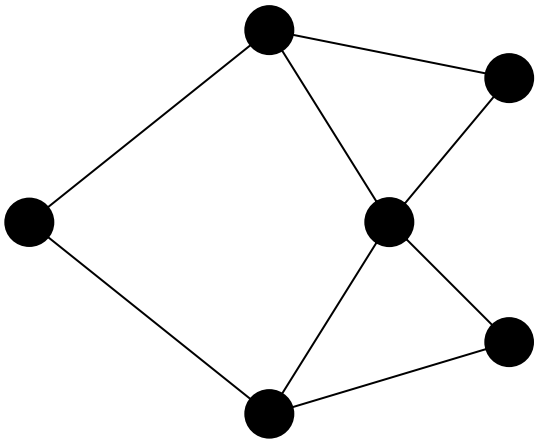
Question 3

A connected graph has 5 faces. The number of vertices and edges in this graph is

A. 6 vertices and 7 edges
B. 4 vertices and 6 edges
C. 3 vertices and 6 edges
D. 9 vertices and 6 edges
E. 5 vertices and 12 edges

TURN OVER

Question 4



Which of the following statements is true regarding the graph above?

A. It contains a Hamilton circuit, but no Euler circuit.

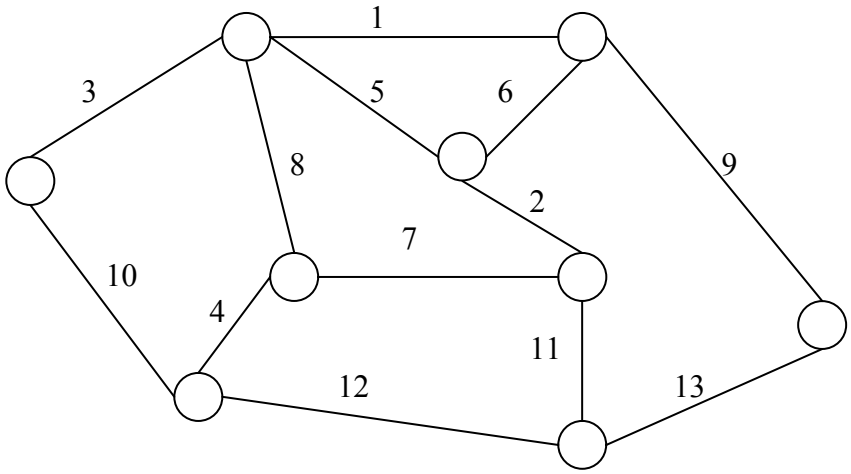
B. Both a Hamilton circuit and an Euler circuit exist for the graph.

C. It is a complete graph.

D. There are no circuits.

E. It contains an Euler circuit but no Hamilton circuit.

Question 5



The minimum spanning tree for the above network **does not** contain the edge with the weight of

A. 1

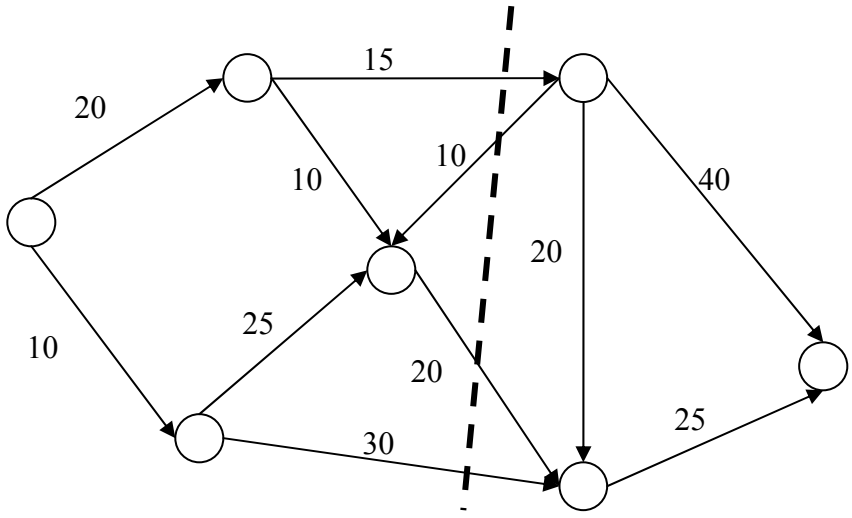
B. 3

C. 6

D. 7

E. 9

Question 6



The capacity of the cut above is given by

A. 15 + 10 + 20 + 30

B. 15 – 10 + 20 – 30

C. 15 – 10 + 20 + 30

D. 15 + 10 – 20 + 30

E. 15 + 20 + 30

Question 7

A minimum spanning tree of a network is drawn. This network could best represent

A. An indoor soccer competition where all teams play each other once.

B. The shortest path that a delivery man could take to deliver packages to all recipients.

C. A project of ordered tasks to be completed.

D. The minimum length of cable that could be used to connect computers in a home network.

E. The shortest time needed to complete a set of task.

TURN OVER

The following information is used for Questions 8 and 9

Task	Duration (hours)	Immediate predecessors
A	3	-
B	5	-
C	4	A
D	3	C
E	5	B
F	2	D
G	1	E
H	5	F and G

Question 8

Which of the following information is **false?**

A. Tasks A and B both have the same earliest starting time.

B. The path A, C, D, F, H is the critical path.

C. Task E can start before Task D.

D. Activity G may start later than activity F.

E. The project will take 18 hours to complete.

Question 9

Crashing task D by 2 hours will reduce the time to complete the project by

A. 0 hours

B. 1 hour

C. 2 hours

D. 3 hours

E. 4 hours

Module 6: Matrices

Question 1

The matrix sum $\begin{bmatrix} 2 & -2 & 0 \\ 3 & -1 & 1 \\ 2 & 2 & -3 \end{bmatrix} + \begin{bmatrix} -1 & 2 & 2 \\ -2 & 3 & 1 \\ 0 & -1 & 3 \end{bmatrix}$ is equal to

A. $\begin{bmatrix} 2 & -2 & 0 & -1 & 2 & 2 \\ 3 & -1 & 1 & -2 & 3 & 1 \\ 2 & 2 & -3 & 0 & -1 & 3 \end{bmatrix}$

B. $\begin{bmatrix} 3 & -4 & -2 \\ 5 & -4 & 0 \\ 2 & 3 & -6 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 0 & 2 \\ 1 & 2 & 2 \\ 2 & 1 & 0 \end{bmatrix}$

D. $\begin{bmatrix} 8 & 4 & -4 \\ 7 & 3 & 0 \\ 3 & 7 & -10 \end{bmatrix}$

E. $\begin{bmatrix} 2 & -2 & 2 \\ -1 & 2 & 8 \\ -6 & 13 & -3 \end{bmatrix}$

Question 2

If A is a 3×2 matrix, B is a 2×1 matrix and C a 1×3 matrix, which of the following products is not defined?

A. AB

B. ABC

C. AC

D. CA

E. BC

TURN OVER

Question 3

Given that $A = \begin{bmatrix} 2 & 3 \\ 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -2 \\ 1 & 4 \end{bmatrix}$, then $2A - B$ is equal to

A. $\begin{bmatrix} -4 & 7 \\ 0 & -7 \end{bmatrix}$

B. $\begin{bmatrix} 1 & -5 \\ -1 & 3 \end{bmatrix}$

C. $\begin{bmatrix} -1 & 5 \\ 1 & -3 \end{bmatrix}$

D. $\begin{bmatrix} 18 & 16 \\ 16 & 8 \end{bmatrix}$

E. $\begin{bmatrix} 1 & 8 \\ 3 & -2 \end{bmatrix}$

Question 4

If $A = \begin{bmatrix} 2 & -2 & 3 \\ 0 & 2 & 3 \\ 2 & 1 & 2 \end{bmatrix}$ and $XA = \begin{bmatrix} 3 & 2 & 6 \\ 2 & 2 & 1 \end{bmatrix}$, then the order of X is

A. 3×2

B. 2×3

C. 3×3

D. 2×2

E. 5×3

Question 5

The cost of 3 cartons of milk and 2 loaves of bread is $8, the cost of 1 carton of milk and 3 loaves of bread $7.80. How would this situation be expressed in matrix form?

A. $\begin{bmatrix} 3 & 2 \\ 1 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 8 \\ 7.8 \end{bmatrix}$

B. $\begin{bmatrix} 3 & 1 \\ 2 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 8 \\ 7.8 \end{bmatrix}$

C. $\begin{bmatrix} 3 & 2 & 8 \\ 1 & 3 & 7.8 \end{bmatrix}$

D. $\begin{bmatrix} 3 & 2 \\ 1 & 3 \end{bmatrix} \begin{bmatrix} 8 \\ 7.8 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$

E. $\begin{bmatrix} 3 & 1 \\ 2 & 3 \end{bmatrix} \begin{bmatrix} 8 \\ 7.8 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$

Question 6

In a survey of 200 campers and 200 hotel patrons it was found that 160 of the campers would go camping again for their next holiday, 40 of the campers would go to a hotel for their next holiday, 190 of the hotel patrons would go to a hotel for their next holiday and 10 of the hotel patrons would go camping for their next holiday. The transition matrix for this information is

A. $\begin{bmatrix} 80 & 95 \\ 20 & 5 \end{bmatrix}$

B. $\begin{bmatrix} 80 & 5 \\ 20 & 95 \end{bmatrix}$

C. $\begin{bmatrix} 160 & 10 \\ 40 & 190 \end{bmatrix}$

D. $\begin{bmatrix} 0.8 & 0.05 \\ 0.2 & 0.95 \end{bmatrix}$

E. $\begin{bmatrix} 0.8 & 0.95 \\ 0.2 & 0.05 \end{bmatrix}$

TURN OVER

Question 7

A company produces Australian team T-shirts, training shirts and playing shirts in adult and youth sizes. The price of each shirt, in dollars, is shown in the matrix below

$$P = \begin{bmatrix} 20 & 35 & 60 \\ 15 & 30 & 50 \end{bmatrix} \begin{matrix} adult \\ youth \end{matrix}$$

The company has decided to increase the price of all shirts for the new season. A new price matrix will be made by multiplying the current price matrix P by M where

$$M = \begin{bmatrix} 1.15 & 0 \\ 0 & 1.2 \end{bmatrix}$$

The new price matrix is

A. $P = \begin{bmatrix} 23 & 40.25 & 69 \\ 18 & 36 & 60 \end{bmatrix}$

B. $P = \begin{bmatrix} 24 & 42 & 72 \\ 18 & 36 & 60 \end{bmatrix}$

C. $P = \begin{bmatrix} 24 & 42 & 72 \\ 17.25 & 34.5 & 57.5 \end{bmatrix}$

D. $P = \begin{bmatrix} 41 & 76.25 & 129 \\ 41.25 & 76.5 & 129.5 \end{bmatrix}$

E. $P = \begin{bmatrix} 23 & 40.25 & 69 \\ 17.25 & 36 & 60 \end{bmatrix}$

Question 8

If $M = \begin{bmatrix} 2 & 4 & 1 & 3 \\ 1 & 3 & 8 & 1 \\ 9 & 2 & 3 & 4 \\ 1 & 2 & 1 & 1 \end{bmatrix}$ and $N = \begin{bmatrix} 3 & 6 & 2 & 1 \\ 2 & 3 & 1 & 3 \\ 1 & 2 & 3 & 1 \\ 3 & 1 & 8 & 6 \end{bmatrix}$, then $0.4M + 0.2N$ is equal to

A. $\begin{bmatrix} 1.6 & 3.2 & 1 & 1 \\ 1 & 1.8 & 2 & 1.4 \\ 2.2 & 1.2 & 1.8 & 1.2 \\ 1.4 & 0.8 & 3.4 & 2.6 \end{bmatrix}$

B. $\begin{bmatrix} 0.8 & 1.6 & 0.4 & 1.2 \\ 0.4 & 1.2 & 3.2 & 0.4 \\ 3.6 & 0.8 & 1.2 & 1.6 \\ 0.4 & 0.8 & 0.4 & 0.4 \end{bmatrix}$

C. $\begin{bmatrix} 1.2 & 2.4 & 0.6 & 1 \\ 0.8 & 1.6 & 3.2 & 0.6 \\ 3.6 & 1.8 & 1.4 & 1.2 \\ 1 & 1 & 2 & 1.6 \end{bmatrix}$

D. $\begin{bmatrix} 1.4 & 2.8 & 0.8 & 1.4 \\ 0.8 & 1.8 & 3.4 & 1 \\ 3.8 & 1.2 & 1.8 & 1.8 \\ 1 & 1 & 2 & 1.6 \end{bmatrix}$

E. $\begin{bmatrix} 0.6 & 1.2 & 0.4 & 0.2 \\ 0.4 & 0.6 & 0.2 & 0.6 \\ 0.2 & 0.4 & 0.6 & 0.2 \\ 0.6 & 0.2 & 1.6 & 1.2 \end{bmatrix}$

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Question 9

A bird migration study of two breeding grounds has shown that the birds follow a transition matrix $T = \begin{bmatrix} 0.7 & 0.2 \\ 0.3 & 0.8 \end{bmatrix}$. If the population of the two breeding grounds at the start of the study is represented by the matrix $P_0 = \begin{bmatrix} 1500 \\ 800 \end{bmatrix}$, what is the population at each breeding ground after 3 years?

A. $\begin{bmatrix} 0.425 & 0.35 \\ 0.525 & 0.65 \end{bmatrix}$

B. $\begin{bmatrix} 0.55 & 0.3 \\ 0.45 & 0.7 \end{bmatrix}$

C. $\begin{bmatrix} 993 \\ 1307 \end{bmatrix}$

D. $\begin{bmatrix} 1065 \\ 1235 \end{bmatrix}$

E. $\begin{bmatrix} 1210 \\ 1090 \end{bmatrix}$

END OF QUESTION BOOK