GENERAL MATHEMATICS

Units 3 & 4 – Written examination 1

TSSM™
Creating VCE Success

2024 Trial Examination

SOLUTIONS

DATA ANALYSIS

Question 1

Answer: **D**

Explanation:

The second variable has to be numerical.

Question 2

Answer: **B**

Explanation:

$$\text{solve}\left(\frac{180000-240000}{s}=-0.85, s\right)$$
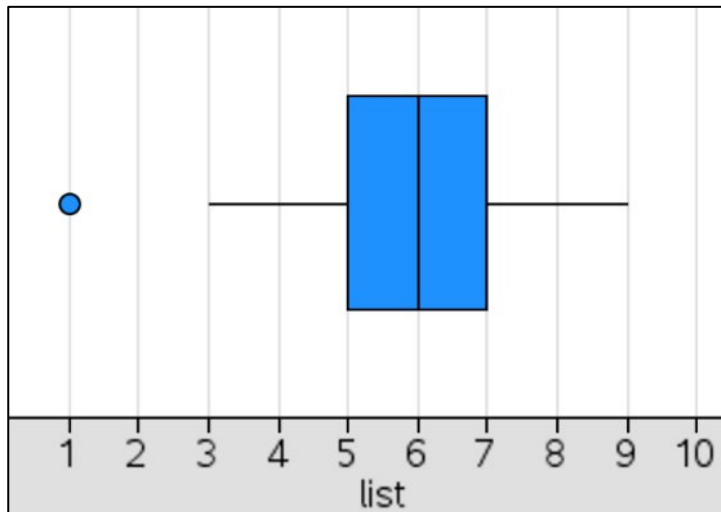$$s=70588.2352941$$

Question 3

Answer: **D**

Explanation:

The lower quartile could be equal to the minimum.

Question 4

Answer: **C**

Explanation:

Question 5

Answer: **E**

Explanation:

Approximately symmetric with an outlier.

Question 6

Answer: **D**

Explanation:

2 standard deviations from the mean
$$\frac{95}{100} \times 1800 = 1710$$

Question 7

Answer: **B**

Explanation:

$$\frac{(6 \times 24) + x}{7} = 25 \rightarrow x = 31$$

Question 8

Answer: **A**

Explanation:

$Modal\ CI\ of\ given\ histogram\ is\ 3 - 3.5$
$Modal\ CI\ of\ sales\ is\ 10^3 - 10^{3.5} = 1000 - 3162$

Question 9

Answer: **E**

Explanation:

Since the slope is positive, the r-value is between 0 and 1 (both inclusive)

Question 10

Answer: **A**

Explanation:

height' = 1.03m from data

using the least squares equation
height = 0.1203 + (0.4316 x 2.1) = 1.027m

residual = height' - height
$\qquad$ = 1.03 - 1.027
$\qquad$ = 0.003m

Question 11

Answer: **C**

Explanation:

$\frac{15+34+181}{500} \times 100 = 46\%$

Question 12

Answer: **D**

Explanation:

A significant change in % from low to medium to high has to be evident for an association.

Question 13

Answer: **A**

Explanation:

Solve on CAS: $11.2 = -2.7 + 15.6 \times log_{10}(age)$

Question 14

Answer: **C**

Explanation:

$Median(330, 300, 320, 310, 330, 340, 350) = 330$

Question 15

Answer: **B**

Explanation:

Create a list on CAS
Median = 320

Question 16

Answer: **D**

Explanation:

$\frac{1}{0.75} \approx 1.333$

33% increase

RECURSION AND FINANCIAL MODELLING

Question 17

Answer: **E**

Explanation:

$K_1 = 1 - 6 = -5$
$K_2 = 1 - (-5) = 6$

Question 18

Answer: **B**

Explanation:

$\frac{48}{0.02} = 2400$

Question 19

Answer: **A**

Explanation:

Depreciated amount each year is $48.

Question 20

Answer: **B**

Explanation:

$\frac{45000 - 9000}{8} = 4500$
$Annual\ depreciation\ rate = \frac{4500}{45000} \times 100 = 10\%$

Question 21

Answer: **B**

Explanation:

$9000 = 45000 \left(1 - \frac{r}{100}\right)^8 \rightarrow r = 18.22\%$

$Value\ after\ six\ years = 45000 \times \left(1 - \frac{18.22}{100}\right)^6 = \$13461.55$

Question 22

Answer: **C**

Explanation:

$1 + \frac{r}{400} = 1.0115 \rightarrow r = 4.6, \ eff(4.6, 4) = 4.68\%$

Question 23

Answer: **D**

Explanation:

Finance Solver	
N:	53.072440727925 ▶
I(%):	4.6 ▶
PV:	30000. ▶
Pmt:	-758.35 ▶
FV:	0. ▶
PpY:	4

Finance Solver	
N:	53. ▶
I(%):	4.6 ▶
PV:	30000. ▶
Pmt:	-758.35 ▶
FV:	-54.59933252688 ▶
PpY:	4

$Last\ payment = \$758.35 + \$54.60 = \$812.95$

Question 24

Answer: **C**

Explanation:
$P_1 = 1.08a - 1200$
$\rightarrow 8\% \ of \ a = 1200$
$0.08a = 1200$
$a = \dfrac{1200}{0.08}$
$\therefore a = 15000$

MATRICES

Question 25

Answer: **A**

Explanation:

v_{21} = Element in row 2 and column 1.

Question 26

Answer: **D**

Explanation:

$V\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$ results in row elements being added.

Question 27

Answer: **B**

Explanation:

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 0 \end{bmatrix} \cdot \begin{bmatrix} g \\ r \\ o \\ u \\ p \\ s \end{bmatrix} = \begin{bmatrix} g \\ o \\ r \\ u \\ s \\ p \end{bmatrix}$$

Unchanged- g, u

Question 28

Answer: **C**

Explanation:

$$\begin{bmatrix} 0.5 & 0. & 0.8 \\ 0.25 & 0.5 & 0 \\ 0.25 & 0.5 & 0.2 \end{bmatrix}^{42} = \begin{bmatrix} 0.471 & 0.471 & 0.471 \\ 0.235 & 0.235 & 0.235 \\ 0.294 & 0.294 & 0.294 \end{bmatrix}$$

Question 29

Answer: **E**

Explanation:

$$\begin{bmatrix} r_{11} & r_{12} & r_{13} \\ r_{21} & r_{22} & r_{23} \end{bmatrix} = \begin{bmatrix} 1-1^2 & 1-2^2 & 1-3^2 \\ 2-1^2 & 2-2^2 & 2-3^2 \end{bmatrix} = \begin{bmatrix} 0 & -3 & -8 \\ 1 & -2 & -7 \end{bmatrix}$$

Question 30

Answer: **A**

Explanation:

Try any column matrix here:

Inverse only exists when the matrix is a square matrix and determinant is non-zero.

Question 31

Answer: **D**

Explanation:

0.3 represents survival rate to the next age group.

Question 32

Answer: **A**

Explanation:

$$\begin{bmatrix} 0.3 & 0.6 & 0. & 0.7 \\ 0.4 & 0.2 & 0.2 & 0.1 \\ 0. & 0.1 & 0.3 & 0.1 \\ 0.3 & 0.1 & 0.5 & 0.1 \end{bmatrix} . \begin{bmatrix} 80 \\ 55 \\ 45 \\ 60 \end{bmatrix} \qquad \begin{bmatrix} 99. \\ 58. \\ 25. \\ 58. \end{bmatrix}$$

$$\begin{bmatrix} 0.3 & 0.6 & 0. & 0.7 \\ 0.4 & 0.2 & 0.2 & 0.1 \\ 0. & 0.1 & 0.3 & 0.1 \\ 0.3 & 0.1 & 0.5 & 0.1 \end{bmatrix} . \begin{bmatrix} 99. \\ 58. \\ 25. \\ 58. \end{bmatrix} \qquad \begin{bmatrix} 105. \\ 62. \\ 19.1 \\ 53.8 \end{bmatrix}$$

$$\frac{20}{100} \times 58 = 11.6$$

$$\frac{11.6}{62} \times 100 = 18.7$$

NETWORKS AND DECISION MATHEMATICS

Question 33

Answer: **C**

Explanation:

$v = 5, e = 4, f = 1 \rightarrow v + f = 6 = e + 2.$

Question 34

Answer: **D**

Explanation:

Definition of minimum spanning tree.

Question 35

Answer: **B**

Explanation:

	Task 1	Task 2	Task 3	Task 4
Jay	4	0	0	2
Kai	2	1	3	0
Lee	8	4	0	4
Mario	3	0	0	0

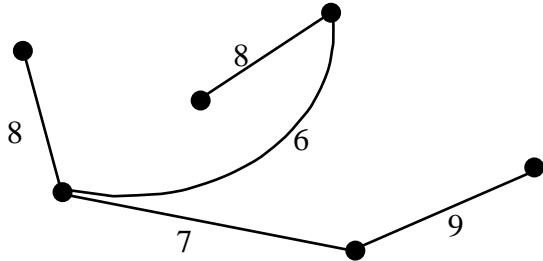|	Task 1	Task 2	Task 3	Task 4
Jay	2	0	0	2
Kai	0	1	3	0
Lee	6	4	0	4
Mario	1	0	0	0

Optimal allocation reached. Lee- 3, Jay- 2, Kai- 1, Mario- 4
Minimum time $= 6 + 6 + 9 + 9 = 30$

Question 36

Answer: **B**

Explanation:

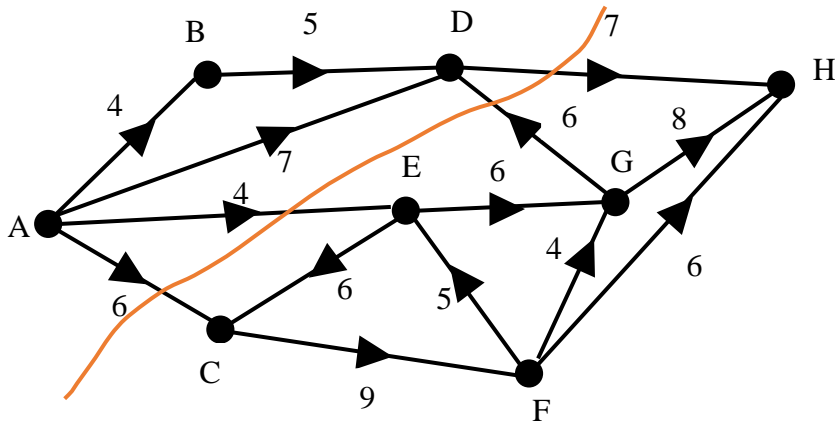Minimum weight = 8 + 7 + 8 + 6 + 9 = 38

Question 37

Answer: **E**

Explanation:
$5 + f = e + 2 \rightarrow e = f + 3$

Question 38

Answer: **B**

Explanation:

Question 39

Answer: **A**

Explanation:

Make sure all predecessor activities are included.

Question 40

Answer: **C**

Explanation: