GENERAL MATHEMATICS

Units 3 & 4 – Written examination 1

TSSM™
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2023 Trial Examination

SOLUTIONS

SECTION A: Multiple-choice questions (1 mark each)

DATA ANALYSIS

Question 1

Answer: **E**

Explanation:

All are categorical (note magnitude is an ordinal type data)

Question 2

Answer: **B**

Explanation:

$10^{4.2} \approx 15848.93$

Question 3

Answer: **C**

Explanation:
Looking at the 18th dot from left (or right)

Question 4

Answer: **D**

Explanation:

$$\frac{19}{35} \times 100 = 54\%$$

Question 5

Answer: **C**

Explanation:
Scatterplot is clearly non-linear.

Question 6

Answer: **E**

Explanation:

$8 - 2 \times 1.5 = 5$

$50\% + 34\% + 13.5\% = 97.5\% \rightarrow \frac{97.5}{100} \times 230 = 224$

Question 7

Answer: **D**

Explanation:
$Interpretation\ of\ the\ slope, slope = 26.81\ hundreds\ of\ dollars = 2681$

Question 8

Answer: **A**

Explanation:

$Amount\ of\ funding\ (in\ '00) = 4560 + 26.81 \times 1650 = \$48796.5 \times 100 = \$4879650$

Question 9

Answer: **E**

Explanation:

Exam grade- ordinal
Math subject- nominal

Question 10

Answer: **C**

Explanation:

$$\frac{17}{57} \times 100 = 29.8\%$$

Question 11

Answer: **B**

Explanation:

$(170, 60) \ and \ (182, 70) \ are \ on \ the \ line$
$b = \frac{70-60}{182-170} = 0.83333$
$y = a + \frac{10}{12}x \rightarrow 60 = a + \frac{10}{12} \times 170 \rightarrow a = -81.67$

Question 12

Answer: **C**

Explanation:

$r^2 = 0.8649 \ (86.49\% \ of \ variation \ in \ weight \ can \ be \ explained \ by \ variation \ in \ height)$
Hence 100% - 86.49% = 13.51%

Question 13

Answer: **D**

Explanation:

Move from left to right and read the 5th and 6th data value on the x-axis.

Question 14

Answer: **B**

Explanation:

$$\frac{103+119+99+101}{4} = 105.5 \text{ , } \frac{119+99+101+48}{4} = 91.75$$
$$\frac{105.5+91.75}{2} = 98.625$$

Question 15

Answer: **A**

Explanation:

$$Actual = \frac{1}{SI} \times sales$$
$$\frac{1}{0.80} = 1.25$$

Question 16

Answer: **E**

Explanation:

Any statistic that describes spread cannot be negative.

RECUSION AND FINANCIAL MODELLING

Question 17

Answer: **C**

Explanation:

$V_1 = V_0 + 140 = 12140$
$V_2 = V_1 + 140 = 12280$

Question 18

Answer: **E**

Explanation:
Generate list using recursive relation on CAS

Question 19

Answer: **B**

Explanation:

253 months is approximately 21 years.

Question 20

Answer: **A**

Explanation:

$Unit\ cost = \frac{4650}{8 \times 365} \approx 1.59$

Question 21

Answer: **D**

Explanation:

$R = 1.0105 \; for \; each \; quarter$

Question 22

Answer: **C**

Explanation:

Effective interest rate can only be equal to or more than the nominal interest rate.

Question 23

Answer: **C**

Explanation:

$$P + \frac{P \times 4.02 \times 5}{100} = 6000 \left(1 + \frac{3.72}{100}\right)^{5} \rightarrow solve \; for \; P$$

Question 24

Answer: **A**

Explanation:

Annual interest rate $= 0.81 \times 4 = 3.24$

N:	4.	▶
I(%):	3.24	▶
PV:	-12500.	▶
Pmt:	-1200.9995543047	▶
FV:	17772.63	▶
PpY:	4	▲▼

SECTION B: Multiple-choice questions (1 mark each)

MATRICES

Question 1

Answer: **B**

Explanation:

Element in row 3 and column 1.

Question 2

Answer: **D**

Explanation:

$A + 0.05A = 1.05A$

Question 3

Answer: **E**

Explanation:

$0.2 \times 30 + 0.1 \times 20 + 0.3 \times 40 = 20$

Question 4

Answer: **B**

Explanation:

$$\begin{matrix} & \begin{matrix} this\ day \\ \begin{matrix} B & N & T \end{matrix} \end{matrix} \\ \begin{bmatrix} 0.2 & 0.5 & \boxed{0.1} \\ \boxed{0.2} & 0.1 & 0.6 \\ 0.6 & \boxed{0.4} & 0.3 \end{bmatrix} & \begin{matrix} B \\ N \quad next\ day \\ T \end{matrix} \end{matrix}$$

Question 5

Answer: **A**

Explanation:

PQ is the only product that ends up being a square matrix, so inverse may exist.

Question 6

Answer: **D**

Explanation:

Try any column matrix here:

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \\ d \\ e \end{bmatrix} = \begin{bmatrix} e \\ a \\ c \\ d \\ b \end{bmatrix}$$

Question 7

Answer: **B**

Explanation:

Follow the '1' in rows carefully to make a sequence.

Question 8

Answer: **A**

Explanation:

Each state total could be different.

NETWORKS AND DECISION MATHEMATICS

Question 1

Answer: **B**

Explanation:

Djikstra's algorithm is used to find the shortest path.

Question 2

Answer: **C**

Explanation:

A complete graph is a graph where each vertex is connected to every other vertex directly.

Question 3

Answer: **D**

Explanation:

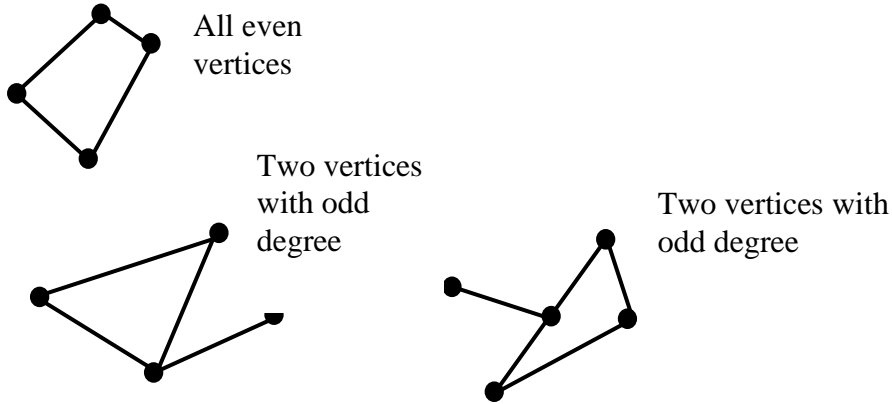A bipartite graph involves allocation of jobs to people.

Question 4

Answer: **E**

Explanation:

If *BE* is removed, the graph becomes disconnected.

Question 5

Answer: **D**

Explanation:

All even vertices

Two vertices with odd degree

Two vertices with odd degree

Question 6

Answer: **B**

Explanation:

$Fatima - 2, \ Gia - 4, \ Holly - 1, \ Iris - 3$

Question 7

Answer: **B**

Explanation:

Complete the forward and backward scan.

Question 8

Answer: **E**

Explanation:

Critical path is *B-E-G-H-J*.