FURTHER MATHEMATICS

Written examination 1

TSSM™
Creating VCE Success

2011 Trial Examination

SOLUTIONS

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

Core: Data Analysis

Question 1

Answer: E

Explanation:

$-1.72 = \dfrac{56 - \text{mean}}{9.3}$, mean $= 72$

Question 2

Answer: E

Explanation:

$Z = -1.5$ lies between 1 and 2 standard deviations below the mean

Question 3

Answer: E

Explanation:

IQR=72-52=20

Question 4

Answer: C

Explanation:

Enter into calculator, s_x=2.0

Question 5

Answer: E

Explanation:

$y = mx + c$, $m = \dfrac{-0.7954 \times 33.7}{8.23} = -3.257$ and $c = 109.3 + 3.257 \times 30.4 = 208.31$

Question 6

Answer: D

Explanation:

$r^2 \times 100\% = (-0.7985)^2 \times 100\% = 63.26\%$

Question 7

Answer: C

Explanation:

$4 - (0.93 + 1.25 + 1.05) = 0.77$

Question 8

Answer: B

Explanation:

Seasonalised sales $= (12000 + 12300 \times 5) \times 0.93 = 68355$

Question 9

Answer: B

Explanation:

$56+2\times9=74$, so 2.5%

Question 10

Answer: E

Explanation:

$(x_L,y_L)=(40,120)$ and $(x_U,y_U)=(140,80)$ Gradient $=\dfrac{80-120}{140-40}=\dfrac{-2}{5}$

Question 11

Answer: B

Explanation:

$8.9=16.1-0.006\times\text{mass}, \quad \text{mass}=\dfrac{8.9-16.1}{-0.006}=1200$

Question 12

Answer: D

Explanation:

$\dfrac{1}{2}\left(\dfrac{13+10+14+7}{4}+\dfrac{10+14+7+20}{4}\right)=11.875$

Question 13

Answer: D

Explanation:

$SI=\dfrac{\text{week 6 goals}}{\text{mean goals of season}}=\dfrac{20}{13.7}=1.460$

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

Question 1

Answer: E

Explanation:

42+69=111

Question 2

Answer: E

Explanation:

$4-2 \neq 8-4$

Question 3

Answer: A

Explanation:

S_8=103.8, where a=36, $r = \dfrac{24}{36}$, n=8

Question 4

Answer: C

Explanation:

Enter in sequence mode and view table, =29.0

Question 5

Answer: C

Explanation:

$2 \times 4+3=11$ and $2 \times 11+3=25$, C

Question 6

Answer: D

Explanation:

$5000 \times 1.04 - 100$ and continue to find t_4

Question 7

Answer: C

Explanation:

The geometric increase is by a factor of $1 + \dfrac{4}{100} = 1.04$ but 100 sheep are sold therefore

$S_{n+1} = 1.04 \times S_n - 100$

Question 8

Answer: E

Explanation:

$t_2 = 3t_1 - 9$, $3 = 3t_1 - 9$, $t_1 = 4$

Question 9

Answer: D

Explanation:

Males:Females=200:340=10:17

SECTION B: Module 2 – Multiple-choice questions (1 mark each)

Question 1

Answer: B

Explanation:

$$A = \pi r^2 \Rightarrow r = \sqrt{\frac{A}{\pi}} = \sqrt{\frac{87}{\pi}} = 5.26$$

Diameter $= 2 \times 5.26 = 10.52$ cm

Question 2

Answer: B

Explanation:

$$AC = \frac{54.2}{\cos 21°} = 58.06$$

Question 3

Answer: C

Explanation:

Herons formula,
$$s = \frac{42 + 53 + 73}{2} = 84$$
$$Area = \sqrt{84(84 - 42)(84 - 53)(84 - 73)} = 1096.8$$

Question 4

Answer: C

Explanation:

Cos Rule $AC^2 = 15^2 + 12^2 - 2 \times 15 \times 12 \times \cos 130°$

Question 5

Answer: E

Explanation:

sin rule $\dfrac{24.5}{\sin 130} = \dfrac{15}{\sin c} \therefore c = 28 + 270 = 298°T$

Question 6

Answer: B

Explanation:

1cm = 500cm, and 10cm=5000cm=50m

Question 7

Answer: A

Explanation:

$\text{Volume} = \left(\dfrac{200}{1}\right)^3 \times 360 = 2880000000 \text{ cm}^3 = 2880 \text{ m}^3$

Question 8

Answer: E

Explanation:

$\text{Volume} = \pi \times 5^2 \times 12 + \dfrac{1}{3}\pi \times 5^2 \times 3 = 300\pi + 25\pi = 325\pi$

Question 9

Answer: B

Explanation:

12:14:18 and 18:21:27 perimeter =18+21+27=66

SECTION B: Module 3 – Multiple-choice questions (1 mark each)

Question 1

Answer: D

Explanation:

$\text{Gradient} = \dfrac{0-4}{3-0} = -\dfrac{4}{3}$

Question 2

Answer: E

Explanation:

$y = 4 - \dfrac{4}{3}x$

Question 3

Answer: A

Explanation:

$\text{Gradient} = \dfrac{-2-8}{5-3} = -5$. Use $y = mx + c \Rightarrow c = 23$

Question 4

Answer: D

Explanation:
Solve simultaneously $x = 5$ and $y = 2$ or substitute $x = 5$ and $y = 2$ into both equationsviz
$3 \times 5 + 4 \times 2 = 23 \; and - 2 \times 5 + 7 \times 2 = 4$

Question 5

Answer: D

Explanation:

$3.20 + 2.50x = 50$

Question 6

Answer: D

Explanation:

$14 \times 4.50 + 16 \times 1.50 = 12 \times 4.50 + d \times 1.50 \Rightarrow d = 22$ Drinks = 22

Question 7

Answer: D

Explanation:

$x = 4$

Question 8

Answer: C

Explanation:

Test all boundary points, maximum at C

Question 9

Answer: E

Explanation:

Graph E as $2^2 = 4$

SECTION B: Module 4 – Multiple-choice questions (1 mark each)

Question 1

Answer: A

Explanation:

$\dfrac{187}{1.1} = 170$, and 10% of 170=17

Question 2

Answer: E

Explanation:

$\text{Interest} = \dfrac{5000 \times 8 \times 4}{100} = 1600$, can spend 1600+5000

Question 3

Answer: A

Explanation:

$r = \dfrac{100 \times 700}{2000 \times 5} = 7\%$

Question 4

Answer: E

Explanation:

N=300 I=5.75 PV=$-$900 PMT=$-$900 FV=? P/Y=C/Y=12

Question 5

Answer: C

Explanation:

N=260 I=2.55 PV=$-$2000 PMT=$-$100 FV=? P/Y=C/Y=52

Question 6

Answer: C

Explanation:

N=360 I=6.57 PV=540000 PMT=? FV=0 P/Y=C/Y=12

Question 7

Answer: D

Explanation:

N=any number I=? PV=300000 PMT=−1575 FV=−300000
P/Y=C/Y=12

Question 8

Answer: C

Explanation:

N=4 I=−15 PV=−3000 PMT=0 FV=? P/Y=C/Y=1 and FV=1566.02, and depreciated
by 3000−1566.02=1433.98

Question 9

Answer: B

Explanation:

N=12 I=7 PV=−1000 PMT=0 FV=? P/Y=C/Y=4, and FV=12314.39
N=8 I=7 PV=−1000 PMT=0 FV=? P/Y=C/Y=4, and FV=11488.82
Difference =interest in third year= $825.47

SECTION B: Module 5 – Multiple-choice questions (1 mark each)

Module 5

Question 1

Answer: E

Explanation:

V+F−E=2, 8+F−13=2

Question 2

Answer: C

Explanation:

Capacity of cut is 3+11=14

Question 3

Answer: E

Explanation:

Critical path is ACFH=8+3+2+7=20

Question 4

Answer: B

Explanation:

Backward scan LST=2

Question 5

Answer: D

Explanation:

LST G=15 EST G=11, 15−11=4

Question 6

Answer: E

Explanation:

Minimum spanning tree =1+3+2+2+1+3=12

Question 7

Answer: D

Explanation:

Euler circuits traverse each path once only and return to start

Question 8

Answer: C

Explanation:

If extra path added between B and C, then deg C=4 and deg B=3, so could not be an Euler circuit

Question 9

Answer: C

Explanation:

Enter in One step Dominance Matrix and find $D+D^2$.The number of one and two step dominances for Team C is 2+3=5, the most

SECTION B: Module 6 – Multiple-choice questions (1 mark each)

Question 1

Answer: D

Explanation:

2 rows and 3 columns

Question 2

Answer: D

Explanation:

$$3A+2B = \begin{bmatrix} 15 & 12 \\ 6 & 3 \end{bmatrix} + \begin{bmatrix} 6 & 0 \\ -2 & 4 \end{bmatrix} = \begin{bmatrix} 21 & 12 \\ 4 & 7 \end{bmatrix}$$

Question 3

Answer: A

Explanation:

First row and second column

Question 4

Answer: E

Explanation:

Take out a factor of 8. $\begin{bmatrix} 0 & 40 \\ 24 & -16 \end{bmatrix} = \begin{bmatrix} 8\times0 & 8\times5 \\ 8\times3 & 8\times-2 \end{bmatrix} = 8\begin{bmatrix} 0 & 5 \\ 3 & -2 \end{bmatrix}$

Question 5

Answer: E

Explanation:

determinant $=35-xy=0, xy=35$

Question 6

Answer: E

Explanation:

$$\det = (1 \times 4) - (3 \times 2) = -2 \quad \text{inverse} = -\frac{1}{2}\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$$

Question 7

Answer: E

Explanation:

$$\text{Transition is:} \begin{bmatrix} 0.8 & 0.1 \\ 0.2 & 0.9 \end{bmatrix}$$

Question 8

Answer: A

Explanation:

$$\begin{bmatrix} 0.8 & 0.1 \\ 0.2 & 0.9 \end{bmatrix}^4 \begin{bmatrix} 30 \\ 70 \end{bmatrix} = \begin{bmatrix} 32.5 \\ 67.5 \end{bmatrix}$$

Question 9

Answer: E

Explanation:

From the information given
$(2 \times 3) \times (x \times 3) \times (y \times z) = (2 \times 5)$
  A   B   C   Product
Number of rows in C = number of columns in B $\Rightarrow y = 3$
Number of columns in C = number of columns in product $\Rightarrow z = 5$