S475/1
SUBSID. MATHEMATICS
Paper 1
July 2017
$2\frac{2}{3}$ hours.

Uganda Advanced Certificate of Education
MOCK SET 4 EXAMINATIONS 2017
SUBSIDIARY MATHEMATICS
Paper 1
2 hours 40 minutes

INSTRUCTIONS TO CANDIDATES

Answer all the **eight** questions in section **A** and only **four** questions in section **B**.

Any additional question(s) will not be marked.

Each question in section **A** carries **5** marks while each question in section **B** carries **15** marks.

All working **must** be shown clearly.

Graph paper is provided.

Where necessary, take acceleration due to gravity, $g = 9.8 \text{ m s}^{-2}$.

Silent non-programmable scientific calculators and mathematical tables with a list of formulae may be used.

SECTION A (40 MARKS)

(Answer **all** questions in this section.)

Qn 1: The arithmetic progression (A.P) is given below:

$$\ln(2-x)+\ln(3-x)+\ln(5-x)+\cdots$$

Find the value of x. [5]

Qn 2: Vector $\underset{\sim}{\boldsymbol{a}} = 3x\underset{\sim}{\boldsymbol{i}} + 4\underset{\sim}{\boldsymbol{j}}$ and $\underset{\sim}{\boldsymbol{b}} = x\underset{\sim}{\boldsymbol{i}} - 3\underset{\sim}{\boldsymbol{j}}$ are perpendicular. Find the possible values of x. [5]

Qn 3: Find the number of ways in which the letters of the word "ATTENDENCE" can be arranged if:

(i). the three E's must **not** be together.

(ii). Only two E's must be together. [5]

Qn 4: Events M and N are such that $P(M' \cap N) = 0.3$, $P(M \cap N) = 0.55$, $P(M' \cap N') = 0.1$. Find:

(i). $P(M)$,

(ii). $P(M \text{ or } N)$. [5]

Qn 5: Solve the equation $\operatorname{cosec}\theta \sec\theta - 2\cot\theta = 0$, for $0° < \theta < 180°$. [5]

Qn 6: A traveller finds out that the price index for breakfast (B), lunch (L) and supper (S) in Kampala and Mbarara were as shown in the table,

Town	Price index		
	B	L	S
Kampala	120	130	125
Mbarara	115	135	110

If the actual quantities consumed by the traveller for B, L and S were 300 g, 400 g and 300 g respectively. Calculate the weighted index for each town and comment on your result. [5]

Qn 7: A continuous random variable X has a mean 15. The probability that X is less than 10 is 0.1057. Find the:

(i). variance to the nearest whole number.

(ii). $P(14 < X < 18)$. [5]

Qn 8: A boy pulls a box of mass 20 kg by means of a light inextensible string attached to it across a rough horizontal ground. The coefficient of friction between the box and the ground is 0.25. If the string is inclined at 30° to the horizontal and the box accelerates at 2 m s^{-2}, find the tension in the string. [5]

SECTION B (60 MARKS)

(Answer any **four** questions from this section.)

Question 9:

The ages in years of teachers in a certain school were recorded as follows:

46	48	40	59	53	23	39	31	34	61	54	54
45	51	33	37	37	27	28	45	48	39	29	23
48	37	39	33	25	31	48	40	53	51	46	45
56	59	40	43	46	38	29	52	54	34	23	41
52	42	50	55	60	45	45	56	59	49	44	36
25	38	56	36	42	47	50	54	59	47	58	57

(a). Construct a grouped frequency table with uniform class width of 5 starting with 20 as the lowest class limit. [3]

(b). Calculate the:
  (i). Mean age.
  (ii). Modal age.
  (iii). Standard deviation. [7]

(c). Draw a cumulative frequency curve and use it to estimate
  (i). the median.
  (ii). The number of teachers who should retire if the retirement age is 55 years. [5]

Question 10:

The table below shows the monthly sales of a certain product in (shs “000”) for the year 2016.

Month	Sales	Month	Sales
January	220	July	175
February	210	August	186
March	200	September	176
April	207	October	170
May	196	November	159
June	189	December	168

(a). Calculate 6-point moving totals and hence the moving averages. [6]

(b). (i). Plot on the same axes actual sales and moving averages. Comment on the trend of sales during the year.

(ii). Determine the sales in January 2017. [9]

Question 11:

Two variables X and Y were recorded as shown below:

X	10	140	120	100	80	70	40	10
Y	150	30	30	50	70	70	90	120

(a). Plot a scatter diagram for the data and comment on the relationship between X and Y. Find X when $Y = 75$. [8]

(b). Calculate a rank correlation coefficient and comment on the value obtained. [7]

Question 11:

(a). Given the matrices $\boldsymbol{A} = \begin{pmatrix} 3 & 1 \\ 2 & 4 \end{pmatrix}$, $\boldsymbol{B} = \begin{pmatrix} -1 & 1 \\ 3 & -5 \end{pmatrix}$. Find:

(i). λ such that $|\boldsymbol{A} - \lambda \boldsymbol{I}| = 0$; where $\boldsymbol{I}$ is a 2×2 identity matrix.

(ii). $\boldsymbol{AB}$ and $\boldsymbol{BA}$ and comment on the results. [8]

(b). Mr. X bought a shirt and a tie at shs. 20,500 and Mr. Y bought two shirts and three ties at shs. 48,000. Form a pair of simultaneous equations for the purchases and use matrix method to determine the cost of a shirt and a tie. [7]

Question 13:

A differential function for a certain curve is given by $\frac{dy}{dx} = x - 1$, given that the curve passes through $(0, 0)$.

(a). Determine the equation of the curve. [5]

(b). Sketch the curve. [3]

(c). Find the area enclosed between the x-axis and the curve. [3]

(d). Differentiate $(3x^2 - 1)^5$; hence or otherwise evaluate:

$\int_0^2 x(3x^2 - 1)^4 \, dx$. [4]

Question 14:

A car of mass one tonne is travelling down an incline of $\sin^{-1}\left(\frac{1}{20}\right)$ against a constant resistance of 2500 N. At an instant 25 m from the lower end of the incline, it is travelling at a velocity 4 m s^{-1} with the engine working at 30 kW. Find the:

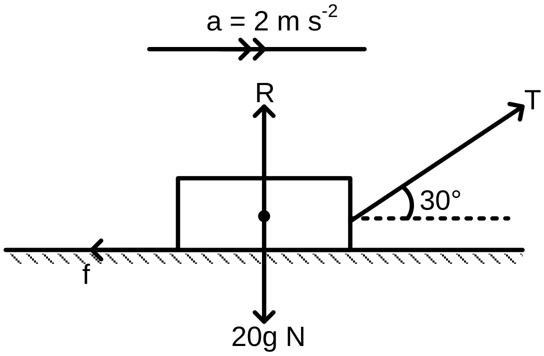
(i). acceleration down the incline.
(ii). Velocity at the end of the incline.
(iii). Power output of the engine required to take it up the incline at a constant velocity of 10 m s^{-1} against the same resistance. [15]

*****END*****

NDEJJE SENIOR SECONDARY SCHOOL
Uganda Advanced Certificate of Education
MARKING GUIDE FOR MOCK SET 4 EXAMINATIONS 2017
SUBSIDIARY MATHEMATICS
Paper 1

SNo.	Working	Marks
1	An A.P has a common difference, $\ln(3-x)-\ln(2-x)=\ln(5-x)-\ln(3-x)$ $\ln\left(\frac{3-x}{2-x}\right)=\ln\left(\frac{5-x}{3-x}\right)$ $\left(\frac{3-x}{2-x}\right)=\left(\frac{5-x}{3-x}\right)$ $(3-x)(3-x)=(2-x)(5-x)$ $3-3x-3x+x^2=10-2x-5x+x^2$ $3-6x=10-7x$ $x=7$	**M1** –equating the common difference **M1** –using laws of logarithm **M1** **M1** –solving **A1**
2	For perpendicular vectors, $a.b=0$ $\binom{3x}{4}.\binom{x}{-3}=0$ $3x^2-12=0$ $x^2=4$ $x=\pm 2$	**M1 M1** – dotting & equating to zero. **B1** –output **M1** –solving **A1** -output
3	(i). Without restriction, "ATTENDENCE" has 10 letters with 2T's, 3E's and 2N's. $\text{number of arrangements}=\frac{10!}{T!\,E!\,N!}=\frac{10!}{2!\,3!\,2!}=151200$ Taking 3E's as one such that they are always together, "ATTNDNC[EEE]" will have 8 letters with 2T's and 2N's $\text{number of arrangements}=\frac{8!}{T!\,\text{N}!}=\frac{8!}{2!\,2!}=10080$	**B1**

	If the three E's are **not** together, $\text{number of arrangements} = 151200 - 10080 = 141120$ (ii). Taking 2E's as one such that they are always together, "ATTENDNC[EE]" will have 9 letters with 2T's, 2E's and 2N's $\text{number of arrangements} = \frac{9!}{T!\,\text{E}!\,\text{N}!} = \frac{9!}{2!\,2!\,2!} = 45360$ $\text{number of arrangements of } 2E's = \frac{2!}{2!} = 1$ $\text{total number of arrangements} = 45360 \times 1 = 45360$	**M1 A1** **M1** **A1**
4	(i). $P(M') = P(M' \cap N) + P(M' \cap N') = 0.3 + 0.1 = 0.4$ $P(M) = 1 - P(M') = 1 - 0.4 = 0.6$ (ii). $P(N) = P(M \cap N) + P(M' \cap N) = 0.55 + 0.3 = 0.85$ $P(M \text{ or } N) = P(M \cup N) = P(M) + P(N) - P(M \cap N)$ $= 0.6 + 0.85 - 0.55 = 0.9$	**B1** **M1 A1** **M1 A1**
5	$\operatorname{cosec}\theta \sec\theta - 2\cot\theta = 0$ $\frac{1}{\sin\theta} \times \frac{1}{\cos\theta} - \frac{2\cos\theta}{\sin\theta} = 0$ $\frac{1}{\sin\theta\cos\theta} - \frac{2\cos\theta}{\sin\theta} = 0$ $\frac{1}{\sin\theta\cos\theta} = \frac{2\cos\theta}{\sin\theta}$ $\sin\theta = 2\sin\theta\cos^2\theta$ $\sin\theta - 2\sin\theta\cos^2\theta = 0$ $\sin\theta\,(1 - 2\cos^2\theta) = 0$ $\sin\theta = 0, \quad \text{or}, \quad (1 - 2\cos^2\theta) = 0$ $\text{for}, \quad \sin\theta = 0, \quad \theta = 0°, 180°$ $\text{for}, \quad (1 - 2\cos^2\theta) = 0, \quad \cos\theta = \pm 0.5,$ $\Longrightarrow \theta = 60°, 120°$ $\therefore \theta = 60°, 120°$	**B1** **B1** **M1 M1** **A1**
6	$\text{Weighted index for Kampala} = \frac{\sum\left(\frac{P_1}{P_0} \times 100 \times W\right)}{\sum W}$ $= \frac{120 \times 300 + 130 \times 400 + 125 \times 300}{300 + 400 + 300}$ $= \frac{36000 + 52000 + 37500}{1000} = \frac{125500}{1000} = 125.5$ $\text{Weighted index for Mbarara} = \frac{\sum\left(\frac{P_1}{P_0} \times 100 \times W\right)}{\sum W}$ $= \frac{115 \times 300 + 135 \times 400 + 110 \times 300}{300 + 400 + 300}$	**M1** **A1** **M1**

	$= \frac{34500 + 54000 + 33000}{1000} = \frac{121500}{1000} = 121.5$ **Comment:** There was a 21.5% increase in the prices of consumed quantities in Mbarara.	**A1** **B1**
7	(i). $P(X < 10) = 0.1057$ $P\left(Z < \frac{10-15}{\sigma}\right) = 0.1057$ $\frac{10-15}{\sigma} = -\phi^{-1}(0.1057)$ but, $\phi^{-1}(0.1026) = 0.26$ Value in Add column $= 1057 - 1026 = 31$ $\phi^{-1}(0.1057) = 0.268$ $\frac{10-15}{\sigma} = -0.268$ $-5 = -0.268\sigma$ $\sigma = 18.657$ variance $= \sigma^2 = 18.657^2 = 348$ (nearest whole number) (ii). $P(14 < X < 18) = P\left(\frac{14-15}{18.657} < Z < \frac{18-15}{18.657}\right)$ $= P(-0.054 < Z < 0.161)$ $= \phi(0.054) + \phi(0.161) = 0.0215 + 0.0640$ $= 0.0855$	**M1** **A1** **M1** **M1** **A1**
8	 Resolving vertically, $R + T\sin 30° = 20g$ $R + 0.5T = 20 \times 9.8$ $R = 196 - 0.5T$ $\Rightarrow f = \mu R = 0.25(196 - 0.5T) = 49 - 0.125T$ Resolving horizontally, $T\cos 30° - f = 20a$ $T\cos 30° - (49 - 0.125T) = 20 \times 2$ $T\cos 30° - (49 - 0.125T) = 40$	**B1** **B1** **M1** **M1**

<table>
<tr>
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$$0.991T = 89$$
$$T = 89.81\text{ N}$$

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<td>A1</td>
</tr>
<tr>
<td>9</td>
<td>

(a).

<table>
<tr><th>Class</th><th>Tallies</th><th>f</th><th>x</th><th>fx</th><th>fx^2</th><th>C.F</th><th>Class boundaries</th></tr>
<tr><td>20-24</td><td>///</td><td>3</td><td>22</td><td>66</td><td>1452</td><td>3</td><td>19.5-24.5</td></tr>
<tr><td>25-29</td><td>$\cancel{////}$ /</td><td>6</td><td>27</td><td>162</td><td>4374</td><td>9</td><td>24.5-29.5</td></tr>
<tr><td>30-34</td><td>$\cancel{////}$ /</td><td>6</td><td>32</td><td>192</td><td>6144</td><td>15</td><td>29.5-34.5</td></tr>
<tr><td>35-39</td><td>$\cancel{////}$
$\cancel{////}$</td><td>10</td><td>37</td><td>370</td><td>13690</td><td>25</td><td>34.5-39.5</td></tr>
<tr><td>40-44</td><td>$\cancel{////}$
///</td><td>8</td><td>42</td><td>336</td><td>14112</td><td>33</td><td>39.5-44.5</td></tr>
<tr><td>45-49</td><td>$\cancel{////}$
$\cancel{////}$
$\cancel{////}$</td><td>15</td><td>47</td><td>705</td><td>33135</td><td>48</td><td>44.5-49.5</td></tr>
<tr><td>50-54</td><td>$\cancel{////}$
$\cancel{////}$
//</td><td>12</td><td>52</td><td>624</td><td>32448</td><td>60</td><td>49.5-54.5</td></tr>
<tr><td>55-59</td><td>$\cancel{////}$
$\cancel{////}$</td><td>10</td><td>57</td><td>570</td><td>32490</td><td>70</td><td>54.5-59.5</td></tr>
<tr><td>60-64</td><td>//</td><td>2</td><td>62</td><td>124</td><td>7688</td><td>72</td><td>59.5-65.5</td></tr>
<tr><td>Total</td><td></td><td>72</td><td></td><td>3149</td><td>145533</td><td></td><td></td></tr>
</table>

(b). (i).

$$\text{Mean age,}\qquad \bar{x} = \frac{\sum fx}{\sum f} = \frac{3149}{72} = 43.736$$

(ii). $L_m = 44.5, \Delta_1 = 15 - 8 = 7, \Delta_2 = 15 - 12 = 3, c = 49.5 - 44.5 = 5$

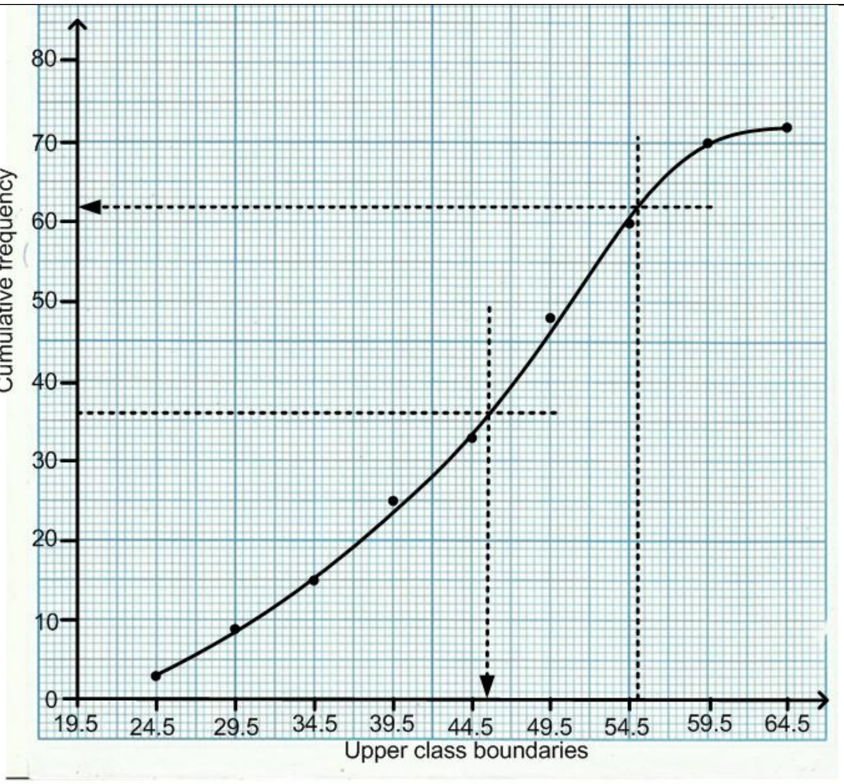
$$\text{Modal age} = L_m + \left(\frac{\Delta_1}{\Delta_1 + \Delta_2}\right)c = 44.5 + \left(\frac{7}{7+3}\right) \times 5$$
$$= 44.5 + 3.5 = 48$$

(iii).

$$\sigma = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2} = \sqrt{\frac{145533}{72} - \left(\frac{3149}{72}\right)^2} = \sqrt{108.444} \approx 10.414$$

(c).

</td>
<td>
B1 –for classes
B1 –for frequencies
B1 –for $\sum fx$
B1 –for $\sum fx^2$
M1 A1
M1
A1
M1 A1
</td>
</tr>
</table>



B1 –axes
B1 –all points
B1 –smooth curve

(i).
Median position: $\frac{1}{2}N = \frac{1}{2} \times 72 = 36$
From the ogive, Median age: $q_2 = 45.5$ years. **A1**
(ii). The estimate number of teachers who should retire if the retirement age is 55 years is $= 72 - 62 = 10$ teachers. **A1**

10 (a).

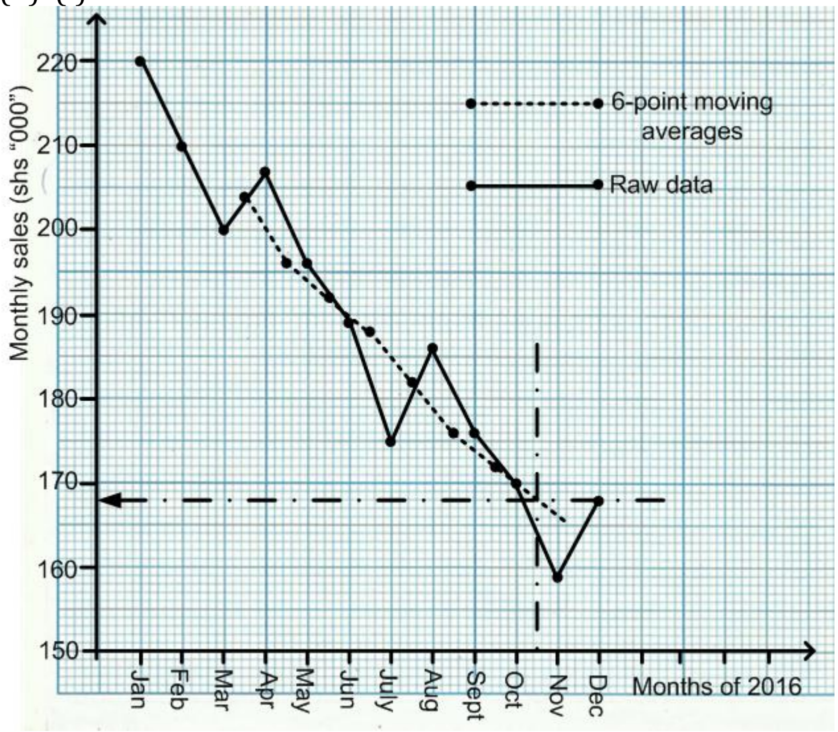
Year	Month	Points	6-point Moving totals	6-point Moving averages
2016	January	220		
	February	210		
	March	200		
			1222	203.67
	April	207		
			1177	196.17
	May	196		
			1153	192.17
	June	189		
			1129	188.17
	July	175		
			1092	182

B3 – moving totals.

B3 – moving averages.

	August	186		
			1055	175.83
	September	176		
			1034	172.33
	October	170		
			$859 + X$	$\frac{859 + X}{6}$
	November	159		
	December	168		
2017	January	X		

(b). (i).



B1 – axes
B1 – plotting of original data
B1 – line for original data
B1 – plotting of moving averages.
B1 – trend line for moving averages.
B1 – tracing the next moving averages

There is a decreasing trend in the average sales during the year 2016.

B1 –comment

(ii). From the graph,

$$\frac{859 + X}{6} = 168$$

M1

$$859 + X = 168 \times 6$$

$$\Longrightarrow X = 168 \times 6 - 859 = 149 \text{ thousand shillinngs}$$

A1

The estimate sales in January 2017 is 149 thousand shillings (i.e. 149,000/=).

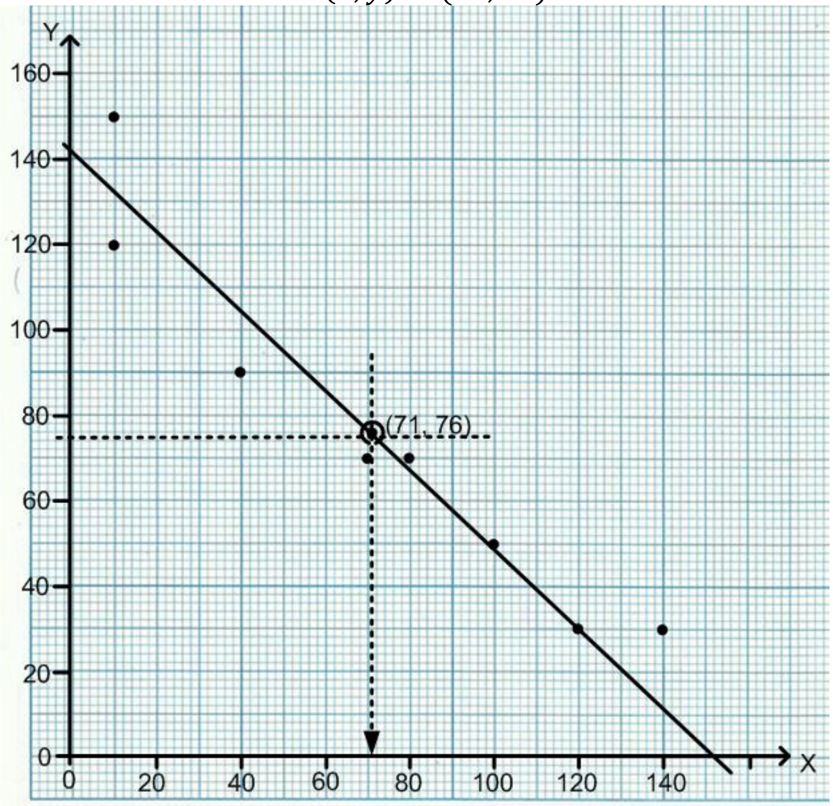
11

X	Y	R_X	R_Y	d	d^2
10	150	7.5	1	6.5	42.25
140	30	1	7.5	-6.5	42.25
120	30	2	7.5	-5.5	30.25
100	50	3	6	-3	9
80	70	4	4.5	-0.5	0.25
70	70	5	4.5	0.5	0.25
40	90	6	3	3	9
10	120	7.5	2	5.5	30.25
$\sum x$ =570	$\sum y$ =610				$\sum d^2$ =163.5

B1 –rank X
B1 –rank Y
B1 – differences
B1 –$\sum d^2$

$$\overline{x} = \frac{\sum x}{n} = \frac{570}{8} = 71.25, \qquad \overline{y} = \frac{\sum y}{n} = \frac{610}{8} = 76.25,$$
$$\Rightarrow (\overline{x}, \overline{y}) = (71, 76)$$

B1 –for $(\overline{x}, \overline{y})$



B1 –axes
B2 –all points
B1 –plotting (71, 76)
B1 –line of best fit
M1 – attempting to find the value of X.

Comment: There is a negative correlation between X and Y.
From the graph, when $Y = 75, X = 71$. **A1**

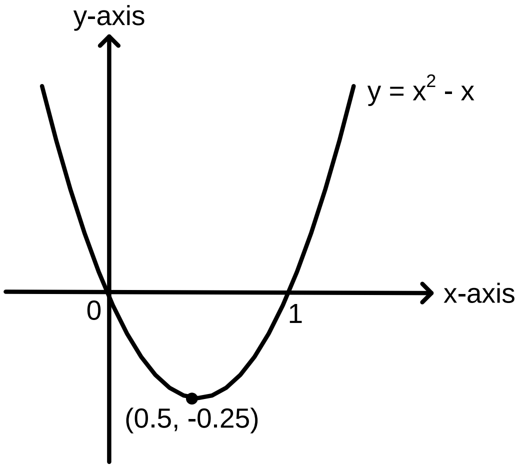
(c).

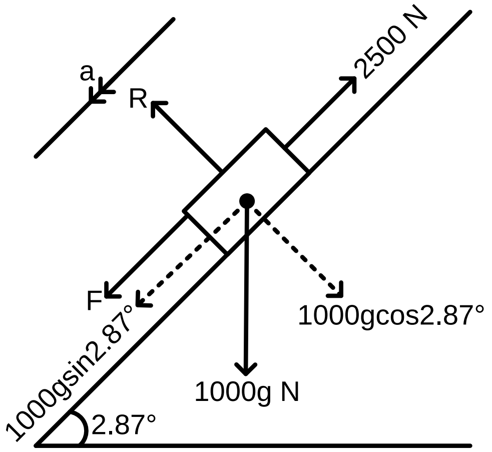
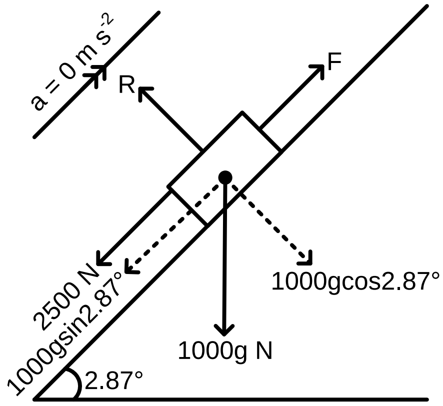
$$\rho = 1 - \frac{6\sum d^2}{n(n^2-1)} = 1 - \frac{6 \times 163.5}{8(8^2-1)} = -0.9464$$ **M1 A1**

Comment: Significant at 1%. (or: Significant at 5%.) **B1**

12 (i).

	$\boldsymbol{A}-\lambda\boldsymbol{I}=\begin{pmatrix}3&1\\2&4\end{pmatrix}-\lambda\begin{pmatrix}1&0\\0&1\end{pmatrix}=\begin{pmatrix}3&1\\2&4\end{pmatrix}-\begin{pmatrix}\lambda&0\\0&\lambda\end{pmatrix}$ $=\begin{pmatrix}3-\lambda&1\\2&4-\lambda\end{pmatrix}$ $\lvert\boldsymbol{A}-\lambda\boldsymbol{I}\rvert=0$ $(3-\lambda)(4-\lambda)-2\times1=0$ $12-3\lambda-4\lambda+\lambda^2-2=0$ $10-7\lambda+\lambda^2=0$ $\lambda^2-7\lambda+10=0$ sum $=-7$, product $=10$, factors $=-2,-5$ $(\lambda-2)(\lambda-5)=0$ $\lambda=2$, or, $\lambda=5$ (ii). $\boldsymbol{AB}=\begin{pmatrix}3&1\\2&4\end{pmatrix}\begin{pmatrix}-1&1\\3&-5\end{pmatrix}=\begin{pmatrix}-3+3&3-5\\-2+12&2-20\end{pmatrix}=\begin{pmatrix}0&-2\\10&-18\end{pmatrix}$ $\boldsymbol{BA}=\begin{pmatrix}-1&1\\3&-5\end{pmatrix}\begin{pmatrix}3&1\\2&4\end{pmatrix}=\begin{pmatrix}-3+2&-1+4\\9-10&3-20\end{pmatrix}=\begin{pmatrix}-1&3\\-1&-17\end{pmatrix}$ Comment: $\boldsymbol{AB}\neq\boldsymbol{BA}$. (b). let x =cost of a shirt and y =cost of a tie. $x+y=20500$ $2x+3y=48000$ $\begin{pmatrix}1&1\\2&3\end{pmatrix}\begin{pmatrix}x\\y\end{pmatrix}=\begin{pmatrix}20500\\48000\end{pmatrix}$ $\begin{pmatrix}x\\y\end{pmatrix}=\frac{1}{3-2}\begin{pmatrix}3&-1\\-2&1\end{pmatrix}\begin{pmatrix}20500\\48000\end{pmatrix}$ $=\frac{1}{1}\begin{pmatrix}61500-48000\\-41000+48000\end{pmatrix}=\begin{pmatrix}13500\\7000\end{pmatrix}$ $\therefore x=13500,\quad y=7000$ A shirt costs shs. 13,500. A tie costs shs. 7,000.	**M1** **M1** **M1** **A1** **M1 A1** **M1 A1** **B1** **B1** **B1** **M1** **M1** **A1 A1**
13	(a). $\frac{dy}{dx}=x-1$ $y=\int(x-1)\,dx$ $y=\frac{1}{2}x^2-x+c$ At the point $(0,0)$, $x=0$ and $y=0$. $\Rightarrow 0=0-0+c,\quad \Rightarrow c=0$ $y=\frac{1}{2}x^2-x$ The equation of the curve is $y=\frac{1}{2}x^2-x$. (b). **Turning point** For turning points, $\frac{dy}{dx}=0$	**M1** **B1** **M1 B1** **A1**

	$x - 1 = 0$ $x = 1$ when, $x = 1,$ $y = \frac{1}{2} \times 1^2 - 1 = -0.5$ turning point is $(1, -0.5)$	**B1**
	Nature of turning point $\frac{dy}{dx} = x - 1$ $\frac{d^2y}{dx^2} = 1$ $\Longrightarrow (1, -0.5)$ is a minimum point	**B1**
	Intercepts when, $x = 0,$ $y = 0 - 0 = 0$ when, $y = 0,$ $\frac{1}{2}x^2 - x = 0$ $x^2 - 2x = 0,$ $\Longrightarrow x(x - 1) = 0$ $x = 0,$ or, $x = 1$	**B1**
	Intercepts are: $(0, 0)$, $(1, 0)$. **Sketch**  	**B1**
	(c). $\text{Area} = \int_0^6 (x^2 - 1)\ dx = \left[\frac{1}{3}x^3 - x\right]_0^1 = \left(\frac{1}{3} \times 1^3 - 1\right) - 0 = -\frac{2}{3}$ $\text{Magnitude of Area} = \left\lvert -\frac{2}{3} \right\rvert = \frac{2}{3}$ sq. units	**M1 M1 –** integration & substitution **A1**
	(d). let, $y = (3x^2 - 1)^5,$ $\Longrightarrow \frac{dy}{dx} = 5 \times 6x \times (3x^2 - 1)^4 = 30x(3x^2 - 1)^4$	**B1**
	$\int_0^2 x(3x^2 - 1)^4\, dx = \left[\frac{(3x^2 - 1)^5}{30}\right]_0^2 = \frac{(3 \times 2^2 - 1)^5}{30} - \frac{(0 - 1)^5}{30}$	**M1**
	$= \frac{161051}{30} - \frac{-1}{30} = \frac{26842}{5} = 5368.4$	**A1**

14	(i). $m = 1 \text{ tonne} = 1000 \text{ kg}, \theta = \sin^{-1}\left(\frac{1}{20}\right) = 2.87°, P =$ $30 \text{ kW} = 30000 \text{ W},\ u = 4 \text{ m s}^{-1}$	
		**B2**
	$P = F \times u, \qquad \Rightarrow F = \frac{P}{u} = \frac{30000}{4} = 7500 \text{ N}$	**B1**
	Resolving parallel to the plane gives,	
	$F + 10000g \sin 2.87° - 2500 = 1000a$	**M1**
	$7500 + 1000 \times 9.8 \times \sin 2.87° - 2500 = 1000a$	**M1**
	$5490.686 = 1000a, \qquad \Rightarrow a = 5.491 \text{ m s}^{-2}$	**A1**
	(ii). $u = 4 \text{ m s}^{-1}, s = 25 \text{ m}, a = 5.491 \text{ m s}^{-2}$	
	$v^2 = u^2 + 2as = 4^2 + 2 \times 5.491 \times 25 = 290.55$	**M1**
	$v = \sqrt{290.55} = 17.046 \text{ m s}^{-1}$	**M1 A1**
	(iii). $v_1 = 10 \text{ m s}^{-1}$	
		**B2**
	Resolving parallel to the plane gives,	

	$F = 10000g\sin 2.87° + 2500 = 1000 \times 9.8 \times \sin 2.87° + 2500$ $= 2990.686\text{ N}$ $P_1 = F \times v_1 = 2990.686 \times 10 = 29906.86\text{ W}$	**M1** **B1** **M1 A1**

*****END*****