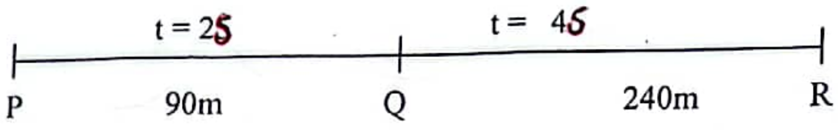
WAKISSHA JOINT MOCK EXAMINATIONS KIROLERO ASHIRAFU
MARKING GUIDE
Uganda Advanced Certificate of Education
UACE August 2024
MATHEMATICS P425/2

$= P(A' \cap B) + P(A \cap B')$.

<table>
<tr><td>1i)</td><td>$P(A\cup B)-P(A\cap B)=\frac{1}{3}$ PE
$P(A)+P(B)-2P(A\cap B)=\frac{1}{3}$
$\frac{1}{2}+\frac{1}{4}-2P(A\cap B)=\frac{1}{3}$
$2P(A\cap B)=\frac{3}{4}-\frac{1}{3}$
$P(A\cap B)=\frac{5}{24}$ or 0·2083.(atleast 4dps)</td><td>M1 for defining A or B but not both
M1 substitution in the formula
A1 out put</td></tr>
<tr><td>(ii)</td><td>$P\left(\bar{B}/A\right)=\frac{P\left(\bar{B}\cap A\right)}{P(A)}$
$=\frac{\frac{1}{2}-\frac{5}{24}}{\frac{1}{2}}$
$=\frac{7}{12}$ or 0·5833 (atleast 4dps)</td><td>M1 Subsitution
A1 output correct.</td></tr>
<tr><td>2i)</td><td><table><tr><td>Old</td><td>35</td><td>40</td><td>x</td></tr><tr><td>New</td><td>50</td><td>65</td><td>80</td></tr></table>$\frac{80-50}{x-35}=\frac{65-50}{40-35}$
$\frac{30}{x-35}=\frac{15}{5}$
$x=45\%$ (with units)</td><td>B1 (mobile for location
M1 equating gradients
A1 correct output with units</td></tr>
<tr><td>ii)</td><td><table><tr><td>Old</td><td>35</td><td>37</td><td>40</td></tr><tr><td>New</td><td>50</td><td>y</td><td>65</td></tr></table>$\frac{65-50}{40-35}=\frac{y-50}{37-35}$
$\frac{15}{5}=\frac{y-50}{2}$
$y=56\%$</td><td>M1 equating gradients
A1 correct output. with units</td></tr>
</table>

3.



From P to Q

$$S = ut + \frac{1}{2}at^2$$

$$90 = 2u + \frac{1}{2}a(2)^2$$

$$45 = u + a \quad \_\_\_\_\_(i)$$

M₁ correct substitution

From Q to R·
$S = 330 \quad t = 6S$

$$330 = 6u + \frac{1}{2}a(6)^2$$

$$55 = u + 3a \quad \_\_\_\_\_(ii)$$

(ii) − (i)

M₁ correct substitution

$$45 = u + a$$
$$-(55 - u + 5a)$$
$$^{-}10 = {}^{-}2a$$

M₁ attempt to solve equations

$$a = 5ms^{-2}$$

A₁ correct output with units

U = 45 − a
= 45 − 5
= $40ms^{-1}$

A₁ correct output with units

5 marks

4

y	1	2	3	4	5
P(y = y)	K	4K	9K	5K	6K
y p(y = y)	K	8K	27K	20K	30K

(i)

K + 4K + 9K + 5K + 6K = 1
25K = 1
$K = \frac{1}{25}$ or 0·04

M₁ summation

A₁ correct out put

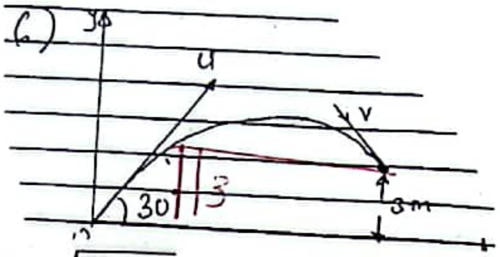
(ii)

E(y) = K + 8K + 27K + 20K + 30K
= 86 K
$= 86 \times \frac{1}{25}$
$= \frac{86}{25} or 3\frac{11}{25}$ or 3·44

M₁ summation of products

A₁ correct output

(iii)	$P(2<X\le 4)=P(x=3)+P(x=4)$ $= 9K + 5K$ $= 14 \text{ X } \frac{1}{25}$ $= 14/25$ Or (0 . 56)	$R.E = \frac{Abs}{Exact}$ A_1 correct output
		5 marks
5	$P = \frac{KT}{V}$ $P + ep = K\,\frac{(T+e_1)}{(V+e_2)}$ $= K\,\frac{(T+e_1)(V-e_2)}{(V+e_2)(V-e_2)}$ e_2 $e_1 << T$ and $e_2 << V$ $e_1 e_1 \simeq 0$ and $e_2^2 \simeq 0$ e_1 and e_2 are too small then $e_1 e_2 \approx 0$ and $e_2^2 \cong 0$ $P + ep = K\left(\frac{TV - Te_2 + Ve_1}{V^2}\right)$ $= K\left[T/V - \frac{Te_2}{V^2} + \frac{e_1}{V}\right]$ $eP = KT/V + K\left[\frac{e_1}{V} - \frac{Te_2}{V^2}\right] - KT/V$ $\lvert eP\rvert = \lvert K\rvert \left\lvert \frac{e_1}{V} - \frac{Te_2}{V^2}\right\rvert$ But $\left\lvert \frac{e_1}{V} - \frac{Te_2}{V^2}\right\rvert \le \left\lvert \frac{e_1}{V}\right\rvert + \left\lvert \frac{Te_2}{V^2}\right\rvert$ $\lvert eP\rvert = K\left[\left\lvert \frac{e_1}{V}\right\rvert + \left\lvert \frac{Te_2}{V^2}\right\rvert\right]$ $R.E_{max} = \frac{\lvert eP\rvert}{P}$ $= \frac{\cancel{K}\left[\left\lvert \frac{e_1}{V}\right\rvert + \left\lvert \frac{Te_2}{V^2}\right\rvert\right]}{\cancel{K}\,T/V}$ $= \left\lvert e_1/V\right\rvert X \cancel{V}/T + \left\lvert \frac{Te_2}{V^2}\right\rvert X V^2/T$ $= \left\lvert e_1/T\right\rvert + \left\lvert e_2/V\right\rvert$ as required	M_1 definition of error. B_1 for the correct assumptions B_1 for triangular inequality M_1 for relative error B_1 correct expression

6.	 Speed V = $\sqrt{V_x^2 + V_y^2}$ But horizontal velocity $V_x = UCos \propto$ = 21 cos30^0 = 18.1865ms^{-1} or $10.5\sqrt{3}$ ms^{-1}.	$y = x\tan\theta - \frac{gx^2}{2u^2}$. B_1 correct $V_x$with or with~~out~~ units
	Vertical velocity $V_y = USin \propto - gt$ = 21 sin30^0 – 9.8 t	
	But y = $USin \propto$ t - $\frac{1}{2}gt^2$ 4.9 t^2 – 10.5t + 3 ⇒ t = 1.8034 Or t = 0.3395	B_1 any value of t.
	Thus V_y 10.5 – 9.8 X 1.8034 = 7.– 1733 ms^{-1} -7·1733 ms^{-1}	B_1 correct V_y magnitude
	Allow V_y 10.5 – 3.3271 = $^+$7.173 ms^{-1}	M_1 calculating the magnitude
	Negative means the ball is moving down wards Speed at impact; V = $\sqrt{(18.1865)^2 + (^-7.1733)^2}$ = 19. 55 ms^{-1}	A_1 correct output with or with~~out~~ units
		5marks
7.i)	Cost of living; $\frac{= (125 X 35) + (121 X 11) + (112 X 8) + (108 X 6) + 118 X 22}{35 + 11 + 8 + 6 + 22}$	M_1 correct substitution
	$\frac{9846}{82}$ = 120.0732	A_1 correct output
	The expenditure increased by 20.0732% in 2004	B_1 correct comment

ii)

$$\frac{P_{2004}}{P_{2000}} X100 = 120.0732$$

$$P_{2004} = \frac{120.0732X11200}{100}$$

M₁ correct substation

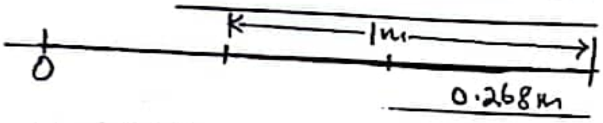
$= 13448.195$

$\approx$ UGX 13448.

A₁ correct output

05 Marks

8



From $V^2 = w^2(a^2 - x^2)$

At 1m $V = 3\sqrt{3}$ ms^{-1}

B₁ attempt to find distance from O

$(3\sqrt{3})^2 = w^2(a^2 - (a-1)^2)$

$27 = w^2(2a - 1)$ ______(i)

M₁ correct substitution

At 0.268m $V = 3$ms^{-1}

$(3)^2 = w^2(a^2 - (a - 0.268)^2)$

$9 = w^2(0.536a - 0.071824)$ ______(ii)

M₁ correct substitution

$$\frac{27}{9} = \frac{w^2(2a-1)}{w^2(0.536a - 0.071824)}$$

$3(0.536a - 0.071824) = (2a - 1)$

$(1.608 - 2)a = {}^{-}1 + 0.0215472$

$$\frac{{}^{-}0.392a}{0.392} = \frac{{}^{-}0.784452}{0.392}$$

M₁ attempt to solve

$a = 2.0013$m

$a \simeq 2$m.

$a \cong 2$m

A₁ correct output with or with~~out~~ units.

5 Marks

9

Time/mm	Freq	X	Fx	C.f	C.B
80- 84	10	82	820	10	79.5 – 84.5
85 – 89	15	87	1305	25	84.5 – 89.5
90 – 94	35	92	3220	60	89.5 – 94.5
95 – 99	40	97	3880	100	94.5 – 99.5
100 – 104	28	102	2856	128	99.5 – 104.5
105 – 109	15	107	1605	143	104.5 – 109.5
110 – 114	4	112	448	147	109.5 - 114.5
115 – 119	3	117	351	150	114.5 – 119.5

$\sum f = 150$ $\sum fx = 14485$

B₁ all values of C.f correct

B₁ All values of Fx correct

B₁ all values of X correct

(i)

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\frac{14485}{150}$$

$= 96.56$

$= \approx 97$ minutes

M₁ correct substitution

A₁ correct output (≥ 2 dp)

(ii)

$$\text{Medium} = l + \left[\frac{N/2 - Cf_b}{f_m}\right] xi$$

$$= 94.5 + \left(\frac{75-60}{40}\right) X5$$

$$= 94.5 + \frac{15}{40} X5$$

$= 96.375$ minutes

M₁ correct substitution

A₁ correct output

(≥ 2 dp)

With or without units

b)(ii)

Number of times = 148 – 28

= 120 times ± 2

B₁ any value read correctly from graph

M₁ Subtraction

A₁ Correct out put

b)(i)

On graph paper at the back

10a)

Let δ be the ~~weight~~ mass per unit area.

Portion	Area (m²)	~~Weight~~ mass	C.O.G from AB
Square	$4m^2$	$4m^2 \cdot \delta$	M
Semi – circle	$\pi/2\, m^2$	$\pi/2\, m^2 \delta$	$4M/3\pi$
Remainder	$4m - \pi/2\, m^2$	$\left(4m - \pi/2\, m^2\right)\delta$	$\bar{X}$

AB $4m^2 m - \pi/2\, m^2\, 4m/3\pi = \left(4m^2 - \pi/2\, m^2\right)\bar{X}$

$$4m - 2/3\, m = \left(4 - \pi/2\right)\bar{X}$$

$$\frac{12m - 2m}{3} = \left(\frac{8-\pi}{2}\right)\bar{X}$$

$$\bar{X} = \frac{10m^2 X2}{3(8-\pi)}$$

$$= \frac{20M}{3(8-\pi)}$$

B₁ correct column of area

B₁ correct column of weight

B₁ Correct column of C.O.M from AB

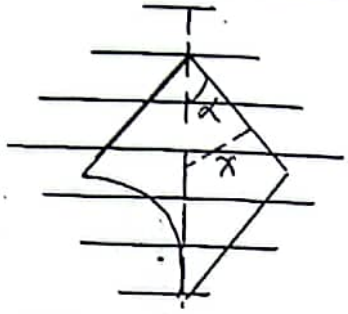
M₁ Correct moments

M₁ equating moments

M₁ Simplification

B₁ Correct expression

b)



B₁

$$X = 2M - \frac{20M}{3(8-\Pi)}$$

M₁ obtaining difference

$$= \frac{6m(8-\Pi)-20m}{3(8-\Pi)}$$

$$= \frac{28m-6m\Pi}{3(8-\Pi)}$$

$$= \frac{2(14-3\Pi)m}{3(8-\Pi)}$$

M₁ simplification

$$\tan \propto = {}^{x}\!/_{m}$$

M₁ correct substitution

$$= \frac{\frac{2(14-3\Pi)m}{3(8-\Pi)}}{m}$$

$$= \frac{2(14-3\Pi)}{3(8-\Pi)}$$

B₁ correct expression

11a)

$$h = \frac{2-1}{6-1} = \frac{1}{5} = 0.2$$

X	$y_0,\ y_5$	Y_1 -------y_4
1.0	0.2500	
1.2		0.16949
1.4		0.13060
1.6		0.10724
1.8		0.091463
2.0	0.0800	
	Sum = 0.3300	Sum = 0.498793

B₁ attempt to find h

B₁ values of x

B₁ correct values of y ≥ 5sfs

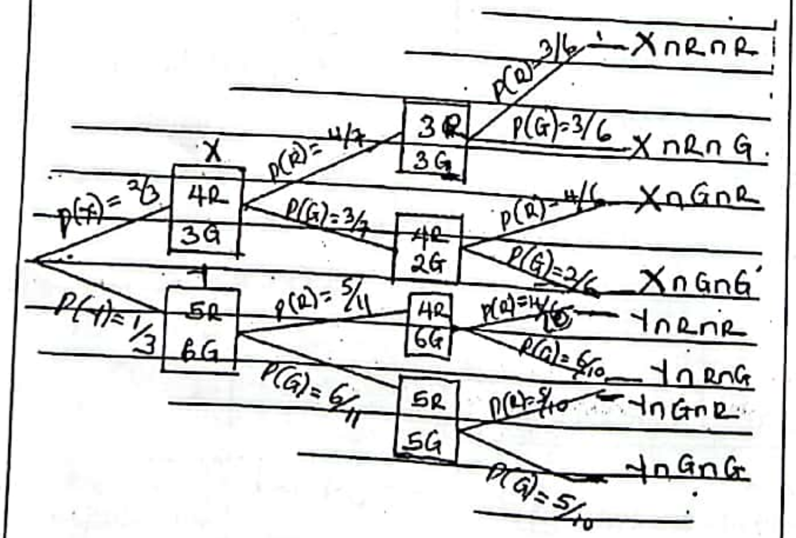
$$\int_1^2 \left(\frac{x}{7x^2-3}\right)dx \cong \frac{1}{2} X \frac{1}{5}(0.3300+2(0.498793))$$

$$\cong 0.1328(4sfs)$$

= 0·1327

M₁ correct substitution

A₁ correct output (4sfs)

bi)	Exact value = $\frac{1}{14}ln\left[7x^2-3\right]_1^2$ = $\frac{1}{14}[l25-l4]$ = 0.1309 (4sfgs)	M_1 correct integration M_1 correct substation of limits A_1 correct output (4sf)
ii)	Percentage error = $\left\lvert\frac{0.1309-0.1328}{0.1309}\right\rvert X100$ = 1.45%	M_1 Absolute error M_1 percentage error A_1 Correct output with or without the % sign
iii)	By increasing the number of ordinates	B_1 Correct comment if all the 11 marks above are earned
		12 Marks
12i)	P(x) = 2P(y) But P(x) + P(y) = 1 2P(y) + P(y) = 1 P(y) = $\frac{1}{3}$ Hence P(x) = $\frac{2}{3}$ Tree diagram 	B_1 Probilities of x and y
a)	$\left(\frac{2}{3}X\frac{4}{7}X\frac{3}{6}\right)+\left(\frac{2}{3}X\frac{3}{7}X\frac{2}{6}\right)+$ $\left(\frac{1}{3}X\frac{5}{11}X\frac{4}{10}\right)+\left(\frac{1}{3}X\frac{6}{11}X\frac{5}{10}\right)$ = 0.4372 (≥ 4 drops)	M_1 any two arms correct M_1 adding the arms A_1 Correct output ≥ dps

<table>
<tr>
<td></td>
<td>$P(x=0)=\left(\frac{2}{3} X \frac{3}{7} X \frac{2}{6}\right)+\left(\frac{1}{3} X \frac{6}{11} X \frac{5}{10}\right)$
$P(x=0)=\frac{43}{231}$

$P(x=1)=2\left(\frac{43}{3} X \frac{4}{7} X \frac{3}{6}\right)+\left(\frac{2}{3} X \frac{3}{7} X \frac{4}{6}\right)$
$+\left(\frac{1}{3} X \frac{5}{11} X \frac{6}{10}\right)+\left(\frac{1}{3} X \frac{6}{11} X \frac{5}{10}\right)$

$P(x=1)=\frac{130}{231}$
$P(x=2)=\left(\frac{2}{3} X \frac{4}{7} X \frac{3}{6}\right)+\left(\frac{1}{3} X \frac{5}{11} X \frac{4}{10}\right)$

$=\frac{174}{693}=\frac{58}{231}$

<table>
<tr><td>x</td><td>0</td><td>1</td><td>2</td></tr>
<tr><td>P (X = x)</td><td>$\frac{43}{231}$</td><td>$\frac{130}{231}$</td><td>$\frac{174}{693}$</td></tr>
</table>
</td>
<td>M_1 both arms correct and added

M_1 both arms correct and added

M_1 both arms correct and added

B_1 for all P(X = x) values correct (≥ 4 dp)</td>
</tr>
<tr>
<td>(c)</td>
<td>Mean = $\left(0X\frac{43}{231}\right)+\left(1X\frac{130}{231}\right)+\left(2X\frac{174}{693}\right)$

Mean = $\frac{738}{693}=\frac{82}{77}$</td>
<td>M_1 products

M_1 addition

A_1 correct output ≥ 2dp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>**12 Marks**</td>
</tr>
<tr>
<td>13(a)

(b)</td>
<td>$a=4e^{-3t}i+12S\text{int}\,j-7Costk$
$a_{t=o}=4e^{-3(0)}i+12Sinoj-7Cosok$
$= 4i-7k$
$\lvert a_{t=o}\rvert=\sqrt{16+49}$
$=\sqrt{65}ms^{-2}or8.062ms^{-2}$

$V=\int adt$
$=\int\left(4e^{-3t}i+12S\text{int}\,j-7Costk\right)dt$

$=\,^{-}\frac{4}{3}e^{-3t}i-12Costj-7\cancel{Cos}\,Sin\,tk+C$

at t = 0, $V = 11i-8j+3k$

$11i-8j+3k = \,^{-}\frac{4}{3}i - 12j+C$</td>
<td>

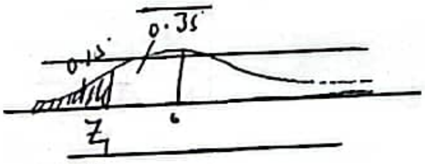
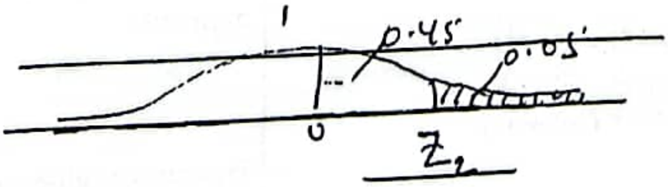
M_1 magnitude
A_1 Correct out put with units or ~~without~~

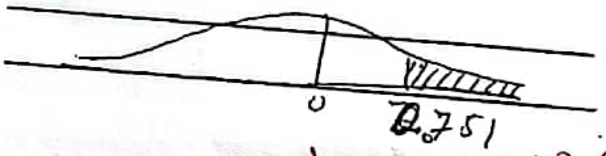
M_1 Correct integration with the constant C seen

M_1 attempt to solve for C</td>
</tr>
</table>

<table>
<tr><td></td><td>$C = \frac{37}{3}i + 4j + 3k$</td><td>$B_1$ Correct value of C</td></tr>
<tr><td></td><td>$V = \left(\left(^{-}4/_3 e^{-3t} + \frac{37}{3}\right)i + (-12Cost + 4)j + (-7S\text{int} + 3)k\right)$ M1</td><td>A_1 Correct expression for V</td></tr>
<tr><td>(C)</td><td>$S = \int vdt$
$= \int\left[\left(^{-}4/_3 e^{-3t} + \frac{37}{3}\right)i + (-12Cost + 4)j + (-7S\text{int} + 3)k\right]dt$
$= (4/_9 e^{-3t} + \frac{37}{3}t)i + (-12S\text{int} + 4t)j + (+7Cost + 3t)k + C$</td><td></td></tr>
<tr><td></td><td>at $t = 0$, $S = 5i - 6j + 2k$</td><td>M_1 correct integration with constant C seen</td></tr>
<tr><td></td><td>$5i - 6j + 2k = \frac{4}{9}i + 7k + c$
$C = \frac{41}{9}i - 6j - 5k$ B1</td><td>attempt to
M_1 ~~correct integration with C seen~~ solve for C</td></tr>
<tr><td></td><td>$S = \left(\frac{4}{9}e^{-3t} + \frac{37}{3}t + \frac{41}{9}\right)i + (-12S\text{int} + 4t - 6)j + (7Cost + 3t - 5)k$</td><td>$B_1$ correct value for S</td></tr>
<tr><td></td><td>$S_{t=1}$
$= 1\left(\frac{4}{9}e^{-3t} + \frac{37}{3}t + \frac{41}{9}i\right) + (^{-}12\sin(1) + 4 - 6)j + (7\cos(1) + 3 - 5)k$</td><td>$M_1$ correct substitution</td></tr>
<tr><td></td><td>$= (16.91i - 12.0977j + \cancel{8.2179}\ 1.7821k)$ m</td><td>A_1-Correct value of S</td></tr>
<tr><td></td><td></td><td>12 Marks</td></tr>
<tr><td>14</td><td>$e^x + x - 4 = 0$
$e^x = 4 - x$

$f(x) = e^x$, $f(x) = 4 - x$
for $f(x) = e^x$
<table><tr><td>x</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>$y = e^x$</td><td>0.367</td><td>1</td><td>2.718</td><td>7.3</td><td>20.08</td></tr></table></td><td>B_1 at least 3 coordinate values seen btn (0 and 2)</td></tr>
<tr><td></td><td>$f(x) = 4 - x$
<table><tr><td>X</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>$f(x) = 4 - x$</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr></table></td><td>B_1 at least 3 cordinate values seen between 0 and 2</td></tr>
<tr><td></td><td>$X_0 = 1.1 \pm 0.1$</td><td>B1 for correct $X_0 \geq 0$ to 1dp</td></tr>
</table>

(b)	$F(x) = e^x + x - 4$ $f^1(x) = e^x + 1$ $X_{n+1} = X_n - \frac{f(X_n)}{f^1(X_n)}$ $= X_n - \frac{e^{xn} + x_n - 4}{e^{xn} + 1}$ $= X_n - \frac{(e^{xn} + 1) - e^{xn} - x_n + 4}{e^{xn} + 1}$ $= \frac{e^{xn}(x_n - 1) + 4}{e^{xn} + 1}$ $x_0 = 1.1$ $x_1 = \frac{e^{1.1}(1.1 - 1) + 4}{e^{1.1} + 1}$ = 1.074 (~~3dp~~) $x_2 = \frac{e^{1.074}(1.074 - 1) + 4}{e^{1.074} + 1}$ = 1.074 ~~(3dp)~~ The root is 1.07 (3 s.f)	M1 correct derravative M1 correct substitution A1 correct expression B1 correct x_1 ≥4s.f B1 correct x_2 ≥4 s.f A1 correct output 3(s.f)
		12 Marks
15	Let x be a random variable for number of goats covered by the people $P(X < 60) = 15\%$ $P(X > 90) = 5\%$ $P(X < 60) = P(Z < \frac{60 - \mu}{\delta}) = 0.15$  $Z_1 = -1.036$ $\frac{60 - N}{\delta} = -1.036$ $60 - N = -1.036\delta$ ------ (1) $P(X > 90) = P(Z > \frac{90 - N}{\delta}) = 0.05$ 	B1 correct Z_1 B1 correct substitution and equating

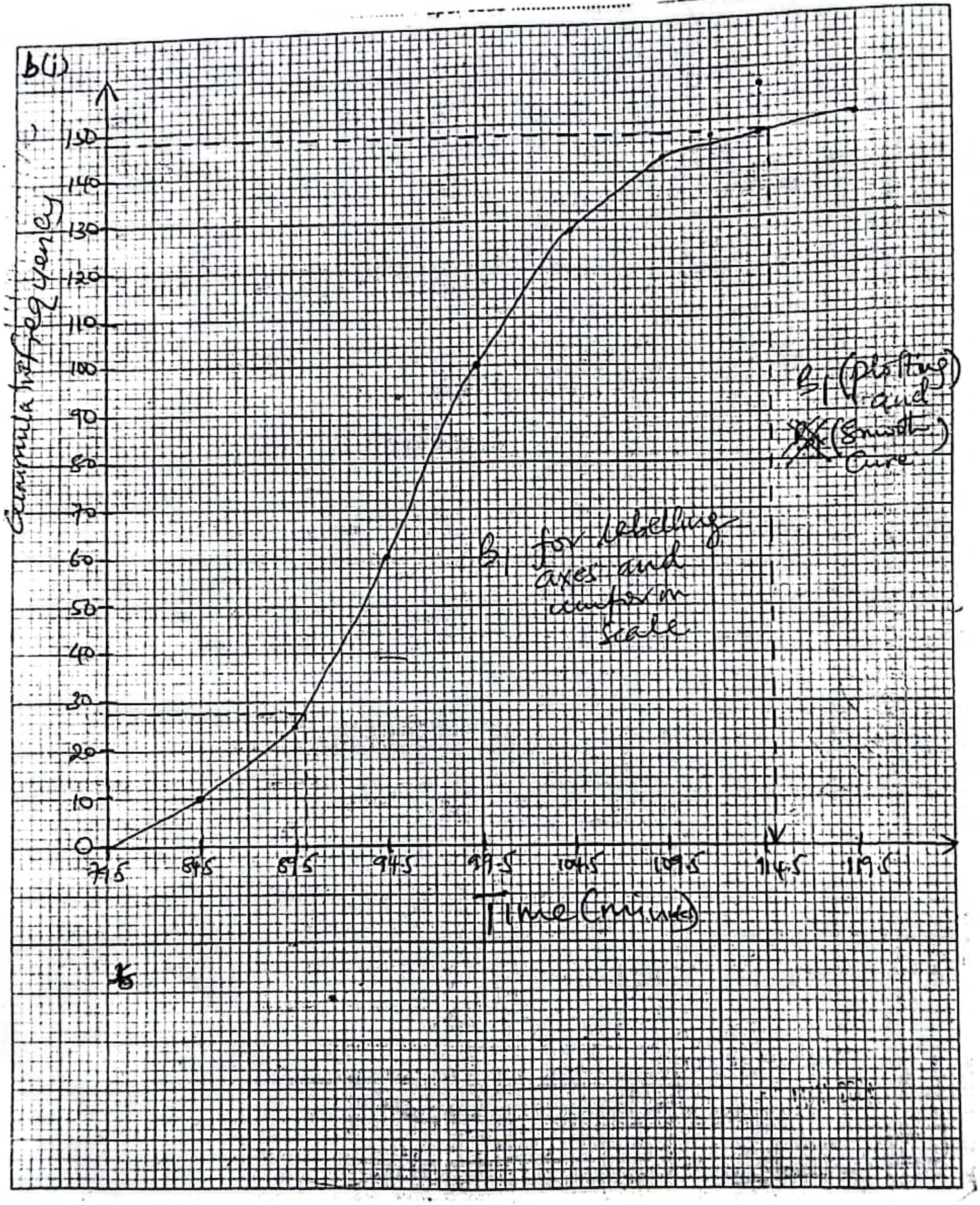
	$Z_2 = 1.645$ $90 - M = 1.6\overset{45}{\delta}$ ----- (ii)	B_1 correct Z_2 B_1 correct substation and equating
	Eqn (i) and eqn (ii) $60 - N = -1.036\,\delta$ $90 - N = 1.645\,\delta$ $\dfrac{^{-}30.0}{^{-}2.681} = \dfrac{^{-}2.681\delta}{^{-}2.681}$ $\delta = 11.1899$ $M = 90 - 1.645 \text{ X } 11.1899$ $= 71.592$	M_1 attempt to solve equations A_1 correct output ≥ 3dp M_1 Attempt to solve equations A_1 correct output ≥ 3 dp
b)	$P(X > 80) = P(Z > \dfrac{80 - 71.592}{11.1899})$ $P(Z > 0.751)$  $= 0.5 - \phi.(0.751)$ $P(0 \le z \le 0.751)$ $= 0.5 - 0.2737$ $= 0.2263$ Number of resultant $= 300 \text{ X } 0.2263$ $= 67.89$ $= 68$	M_1 correct substitution A_1 correct probability ≥ 4dps M_1 correct multiplication A_1 correct output ≥)dps
		12 Marks
16.a)	$\underset{\sim}{R} = (-2\underset{\sim}{i} + 3\underset{\sim}{i}) + (-\underset{\sim}{i} + 2\underset{\sim}{j}) + (4\underset{\sim}{i} - 2\underset{\sim}{i}) + (-\underset{\sim}{i} - 3\underset{\sim}{j})$ $= (-2 - 1 + 4 - 1)\underset{\sim}{i} + (3 + 2 - 2 - 3)\underset{\sim}{j}$ $R = 0\underset{\sim}{i} + 0\underset{\sim}{j}$ The system either forms a couple or is in equilibrium Taking moments ; $\begin{vmatrix} x_1 & x \\ y_1 & y \end{vmatrix}$ moment of constituent forces $G = \begin{vmatrix} ^{-}2 & ^{-}2 \\ 3 & 3 \end{vmatrix} + \begin{vmatrix} 3 & ^{-}1 \\ 1 & 2 \end{vmatrix} + \begin{vmatrix} ^{-}1 & 4 \\ ^{-}3 & ^{-}2 \end{vmatrix} + \begin{vmatrix} 3 & ^{-}1 \\ 1 & ^{-}3 \end{vmatrix}$ $= (-6 + 6) + (6 + 1) + (2 + 12) + (-9 + 1)$ $= 13\text{NM}$	M_1 addition of forces B_1 correct output M_1 for all correct moments B_1 correct values of G with units

	Therefore the system forms a couple of torque 13NM Since F = 0 and G $\neq$ 0, the system forms a couple (of torque 13NM)	B_1 correct conclusion

b)	Resultant force $\underset{\sim}{R} = (-2\underset{\sim}{i} + 3j) + (-\underset{\sim}{i} + 2\underset{\sim}{j}) + (4\underset{\sim}{i} - 2\underset{\sim}{j}) + (2\underset{\sim}{i} + \underset{\sim}{j})$ $= (-2 - 1 + 4 + 2)\underset{\sim}{i} + (3 + 2 - 2 + i)\underset{\sim}{j}$ $\underset{\sim}{R} = (3i + 4\underset{\sim}{j})$ N Let (x $\underset{\sim}{i}$ + y $\underset{\sim}{j}$ be the general point of the equation of the line of action of the resultant force. Moment of resultant force = sum of moments of constituent forces. $\begin{vmatrix} x & 3 \\ y & 4 \end{vmatrix} = (-6 + 6) + (6 + 1) + (2 + 12) + \begin{vmatrix} 3 & 2 \\ 1 & 1 \end{vmatrix}$ $4x - 3y = 21 + (3 - 2)$ $4x - 3y = 22$ Therefore $4x - 3y - 22 = 0$ (line of action) When the line crosses the X – axis, y = 0, $4x - 22 = 0$ Therefore x = 5.5 units from origin	M_1 addition of forces. B_1 correct resultant M_1 obtaining moments M_1 equating moments. B_1 correct equation of the line of action M_1 substitution of y = 0 A_1 correct output

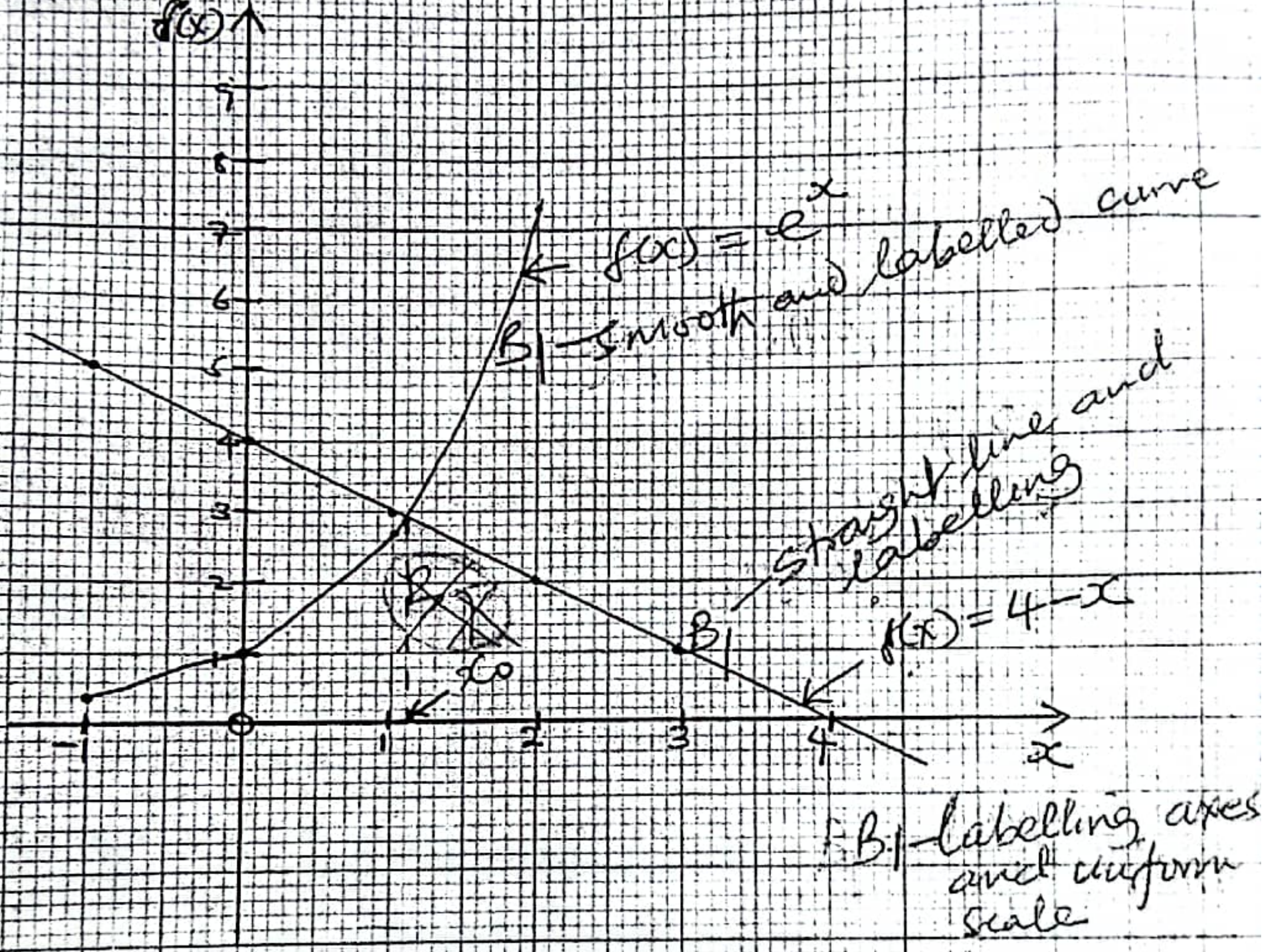
(5.5, 0)

b(i)



B1 for labelling axes and uniform scale

B1 (plotting) and ~~B1~~ (Smooth curve)


f(x)
7
6
7
6
5
4
3
2
1
f(x) = e^x
B1 - smooth and labelled curve
B1
x0
-1
0
1
2
3
4
x
straight line and labelling
B1
f(x) = 4 - x
B1 - labelling axes and uniform scale