MARKING SCHEME

S03

1. (a) -1.492913 (3.5 marks)

(b) 40.304846° (3.5 marks)

(c) 130.93131 (3 marks)

2. (a)(i) Required to prove: $\sinh(A+B) = \sinh A \cosh B + \cosh A \sinh B$

Considering right hand side (RHS)

$RHS = \sinh A \cosh B + \cosh A \sinh B$

By definition

$$RHS = \tfrac{1}{2}(e^{A} - e^{-A})\tfrac{1}{2}(e^{B} + e^{-B}) + \tfrac{1}{2}(e^{A} + e^{-A})\tfrac{1}{2}(e^{B} - e^{-B})$$ (0.5 mark)

$$= \tfrac{1}{4}\left[e^{A+B} + \cancel{e^{A-B}} - \cancel{e^{B-A}} - e^{-(A+B)} + e^{A+B} - \cancel{e^{A-B}} + \cancel{e^{B-A}} - e^{-(A+B)}\right]$$ (1 mark)

$$= \tfrac{1}{4}\left[2e^{A+B} - 2e^{-(A+B)}\right]$$

$$= \tfrac{1}{2}\left[e^{A+B} - e^{-(A+B)}\right]$$

$$= \tfrac{1}{2}\left(e^{A+B} - e^{-(A+B)}\right]$$

$= \cosh(A+B)$ [By definition]

$=$ LHS proved. (0.5 mark)

(ii) Required to prove: $\cancel{\cosh^2 x \sinh^2 x}$

$$\cosh^2 x \sin^2 x - \sinh^2 x \cos^2 x = \frac{1}{2}\left[1 - \cosh 2x \cos 2x\right]$$

Considering LHS

$$LHS = \left[\frac{\cosh 2x + 1}{2}\right]\left[\frac{1 - \cos 2x}{2}\right] - \left[\frac{\cosh 2x - 1}{2}\right]\left[\frac{1 + \cos 2x}{2}\right]$$ (1 mark)

$$= \tfrac{1}{4}\{\cancel{\cosh 2x} - \cos 2x \cosh 2x + 1 - \cancel{\cos 2x} - \cancel{\cosh 2x} - \cos 2x \cosh 2x + 1 + \cancel{\cos 2x}\}$$ (0.5 mark)

$$= \tfrac{1}{4}\left[2 - 2\cos 2x \cosh 2x\right]$$

$$= \tfrac{1}{2}\left[1 - \cos 2x \cosh 2x\right]$$

$=$ RHS, proved ($\tfrac{1}{2}$ mark)

(b) (i) Required to prove

$$\frac{d}{dx}\left[\tanh^{-1}\sqrt{\frac{\cosh x - 1}{\cosh x + 1}}\right] = \frac{1}{2}$$

2 (b) (i) let $y = \tanh^{-1}\sqrt{\frac{\cosh x - 1}{\cosh x + 1}}$

$= \tanh^{-1}\sqrt{\frac{\cosh^2 \frac{x}{2} + \sinh^2 \frac{x}{2} - 1}{\cosh^2 \frac{x}{2} + \sinh^2 \frac{x}{2} + 1}}$ (1 mark)

$= \tanh^{-1}\sqrt{\frac{(\cosh^2 \frac{x}{2} - 1) + \sinh^2 \frac{x}{2}}{\cosh^2 \frac{x}{2} + [1 + \sinh^2 \frac{x}{2}]}}$

$= \tanh^{-1}\sqrt{\frac{\sinh^2 \frac{x}{2} + \sinh^2 \frac{x}{2}}{\cosh^2 \frac{x}{2} + \cosh^2 \frac{x}{2}}}$

$= \tanh^{-1}\sqrt{\frac{2\sinh^2 \frac{x}{2}}{2\cosh^2 \frac{x}{2}}}$

$= \tanh^{-1}\sqrt{\tanh^2 \frac{x}{2}}$

$= \tanh^{-1}(\tanh \frac{x}{2})$

$= \frac{x}{2}$ (0.5 mark)

$\therefore \frac{dy}{dx} = \frac{1}{2}$ (Proved)

(ii) Required to prove:

$$\int_1^2 \frac{1}{(x+1)\sqrt{x^2-1}}\,dx = \frac{1}{\sqrt{3}}$$

let $I = \int_1^2 \frac{1}{(x+1)\sqrt{x^2-1}}\,dx$ (0.5 mark)

let $x = \cosh\theta$ so that $dx = \sinh\theta\, d\theta$

$= \int_a^b \frac{\sinh\theta}{(\cosh\theta + 1)\sqrt{\cosh^2\theta - 1}}\,d\theta$

$= \int_a^b \frac{\cancel{\sinh\theta}}{(\cosh\theta + 1)\cancel{\sinh\theta}}\,d\theta$

$= \int_a^b \frac{1}{2\cosh^2 \frac{\theta}{2}}\,d\theta$ (1 mark)

2 (b) (ii) $= \frac{1}{2}\left[2\tanh \frac{\theta}{2}\right]_a^b$

$= \tanh\left[\frac{1}{2}\cosh^{-1}x\right]\Big|_1^2$

$= \tanh\left[\frac{1}{2}\ln\left|x+\sqrt{x^2-1}\right|\right]_1^2$ (0.5 mark)

$= \tanh\left[\frac{1}{2}\ln\left|2+\sqrt{4-1}\right|\right] - \tanh\left[\frac{1}{2}\left|1+\sqrt{1-1}\right|\right]$

$= \tanh\left[\ln\sqrt{2+\sqrt{3}}\right] - \tanh(0)$

$= \dfrac{e^{\ln\sqrt{2+\sqrt{3}}} - e^{-\ln\sqrt{2+\sqrt{3}}}}{e^{\ln\sqrt{2+\sqrt{3}}} + e^{-\ln\sqrt{2+\sqrt{3}}}}$

$= \dfrac{\sqrt{2+\sqrt{3}} - \frac{1}{\sqrt{2+\sqrt{3}}}}{\sqrt{2+\sqrt{3}} + \frac{1}{\sqrt{2+\sqrt{3}}}}$

$= \dfrac{(2+\sqrt{3}) - 1}{(2+\sqrt{3}) + 1}$

$= \dfrac{1+\sqrt{3}}{3+\sqrt{3}}$

$= \dfrac{(1+\sqrt{3})(1-\sqrt{3})}{(3+\sqrt{3})(1-\sqrt{3})}$

$= \dfrac{1-3}{\cancel{3}-3\sqrt{3}+\sqrt{3}-\cancel{3}}$

$= \dfrac{-2}{-2\sqrt{3}}$

$= \dfrac{1}{\sqrt{3}}$ Proved (1 mark)

3 (a) Application of linear programming

- In transportation to minimize the cost of transportation
- In manufacturing to maximize revenue
- In agriculture to maximize profit
- In management to minimize the cost of running an institution or company on paying salaries. (2 marks)

(b) Let x be the number of type A answered (1 mark)
y be the number of questions of type B answered

objective function

$f(x,y) = 15x + 20y$ (0.5 mark)

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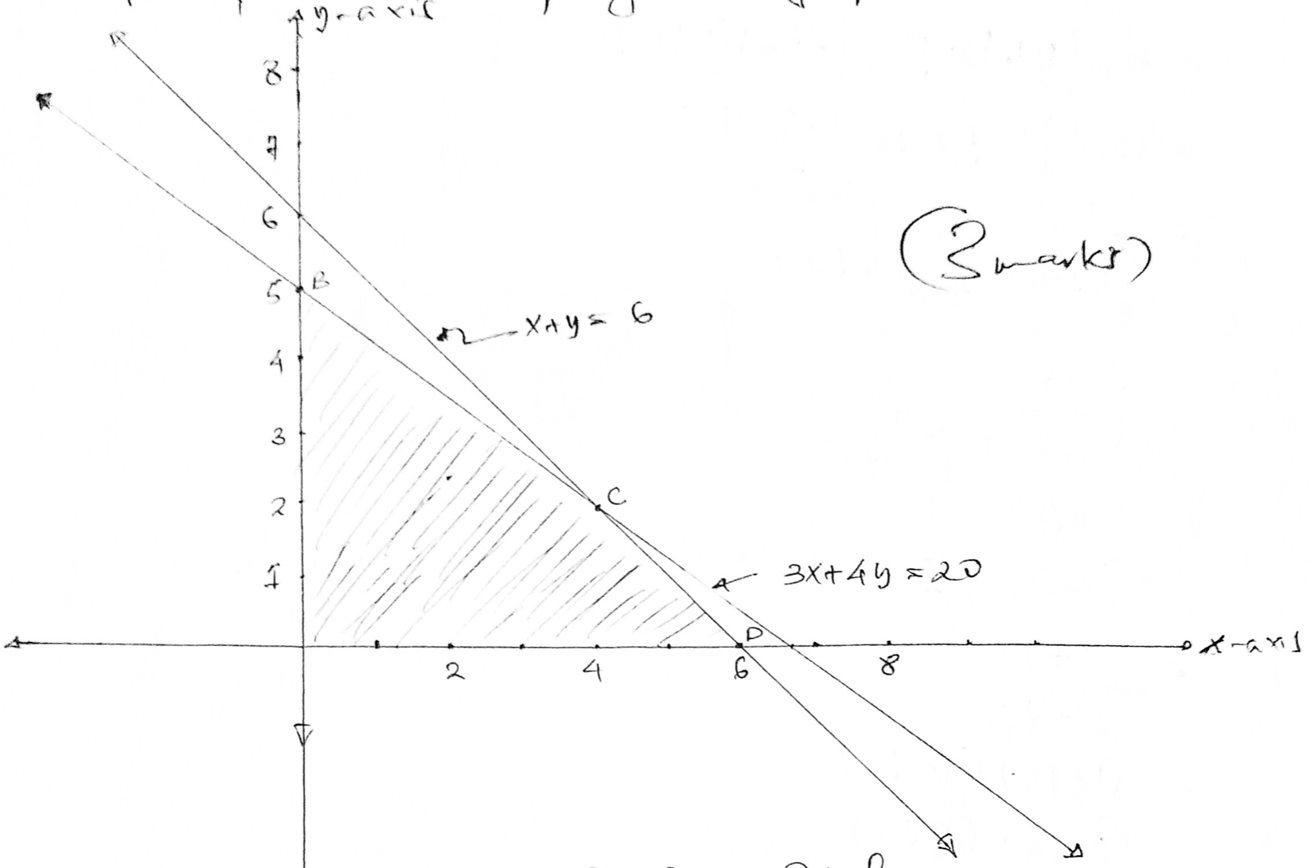
3 (b) Linear constraints

$22x + 36y \leq 3(60)$ or $3x + 4y \leq 20$

$x + y \leq 6$ (1.5 marks)

$x, y \geq 0$

Graph of the linear programming problem.



Testing for corner points

Corner point	Value of $f(x,y) = 15x + 20y$
A (0, 0)	0
B (0, 5)	100
C (4, 2)	100
D (6, 0)	90

(1 mark)

To get the best score 4 questions of type A and two questions of type B must be answered. (1 mark)

4. The derivation of the assumed mean is given by

$d_i = x_i - A$

$f_i d_i = f_i (x_i - A)$

Summing for all the data

$\sum f_i d_i = \sum f_i (x_i - A)$ (0.5 mark)

$= \sum f_i x_i - A \sum f_i$

Divide by $\sum f_i$ both sides

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4 (a) $\frac{\sum f_i d_i}{\sum f_i} = \frac{\sum f_i x_i}{\sum f_i} - A$ (1 mark)

$$\frac{\sum f_i x_i}{\sum f_i} = A + \frac{\sum f_i d_i}{\sum f_i}$$

$$\bar{x} = A + \frac{\sum f_i d_i}{\sum f_i} \quad \text{(1 mark)}$$

Proved.

(b) (i) Evaluating the mean.

Scores (%)	Class mark (x_i)	Frequency (f_i)	$f_i x_i$
62.5 – 67.5	65	4	260
67.5 – 72.5	70	7	490
72.5 – 77.5	75	10	750
77.5 – 82.5	80	22	1760
82.5 – 87.5	85	226	2210
87.5 – 92.5	90	17	1530
92.5 – 97.5	95	9	855
97.5 – 102.5	100	5	500
TOTAL		100	8355

(2 marks)

Mean is given by

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i} = \frac{8355}{100} = 83.56\,\% \quad \text{(2 marks)}$$

Median

Median class = 82.5 – 87.5

Lower class boundary, $L = 82.5$

$$\text{Median} = L + \left[\frac{\frac{1}{2}\sum f_i - f_b}{f_c}\right]c \quad \text{(0.5 mark)}$$

where $c = 87.5 - 82.5$, $f_b = 22 + 10 + 7 + 4 = 43$ (0.5 mark)

$f_c = 26$

4 (b) (i) Median $= 82.5 + \frac{(100/2 - 43)}{26} \times 5 = 83.85\%$ (1 mark)

(ii) The i^{th} percentile is given by

$$P_i = L + \frac{\left(\frac{i}{100}N - f_c\right)}{f_w} C \quad \text{(0.5 mark)}$$

The 70th percentile class is 87.5 – 92.5

$\therefore L = 87.5,\ i = 70,\ f_c = 4+7+10+22+26 = 69$

$f_w = 17$ and $C = 5$ (0.5 mark)

$$P_{70} = 87.5 + \left[\frac{\frac{70}{100} \times 100 - 69}{17}\right] \times 5 = 87.79 \quad \text{(1 mark)}$$

5 (a) (i) Required to prove : $A \cap B' = \Phi$

Given : $A \subset B$

Considering Left hand side (LHS)

$LHS = A \cap B'$

But $A \cap B = A$ since $A \subset B$

$LHS = (A \cap B) \cap B'$ $A = A \cap B$

$= A \cap (B \cap B')$ Associative law

$= A \cap \Phi$ Compliment law

$= \Phi$ Identity law.

(ii) Required to prove $[A \cup (A' \cap B)] \cap [(A \cap B) \cup (A - B)] = A$

Considering left hand side (LHS)

$LHS = [A \cup (A' \cap B)] \cap [(A \cap B) \cup (A - B)]$ Given

$= [A \cup (A' \cap B)] \cap [(A \cap B) \cup (A \cap B')]$ Definition

$= [(A \cup A') \cap (A \cup B)] \cap [A \cap (B \cup B')]$ Distributive law

$= [\mathcal{U} \cap (A \cup B)] \cap [A \cap (\mathcal{U})]$ Compliment law

$= (A \cup B) \cap (A \cup \Phi)$ Identity law

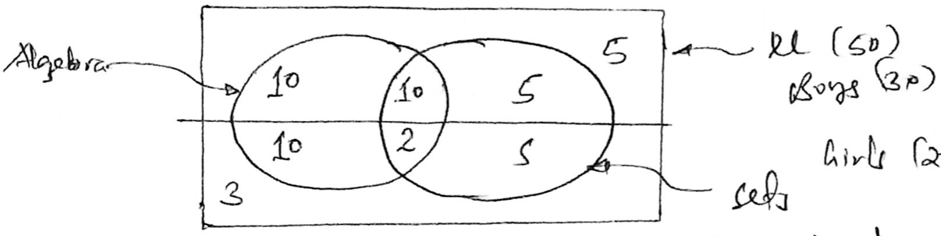
$= A \cup (B \cap \Phi)$ Distributive law

$= A \cup \Phi$ Identity law

$= A$ Identity law

$=$ RHS proved (3 marks)

5 (b) Summary of the set in Venn diagram.



(3 marks)

(i) There are $10+5+5+2 = 22$ students who likes sets (1 mark)

(ii) 5 boys do not like any of the topics (1 mark)

6. (a)(i) Given $f(x) = 2x^2+1$ and $g(x) = 3x-2$

$$fog(x) = f[3x-2]$$
$$= 2[3x-2]^2+1$$
$$= 2[9x^2-12x+4]+1$$
$$= 18x^2-24x+8+1$$
$$\therefore fog(x) = 18x^2-24x+9$$ (1 mark)

$$gof(x) = g[f(x)] = g[2x^2+1]$$
$$= 3(2x^2+1)-2$$
$$= 6x^2+3-2$$
$$\therefore gof(x) = 6x^2+1$$ (1 mark)

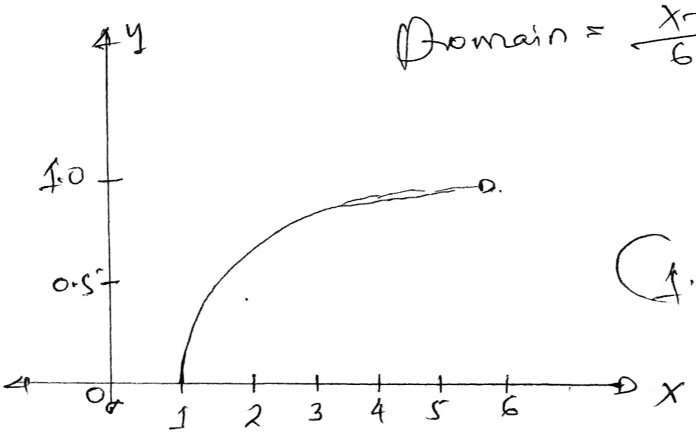
(ii) $gof(x) = 6x^2+1$

let $gof(x) = y$

$$y = 6x^2+1$$
$$x = \sqrt{\frac{y-1}{6}}$$
$$(gof)^{-1}(x) = \sqrt{\frac{x-1}{6}}$$ (2 marks)

Graph of $(gof)^{-1}x$

Domain $= \frac{x-1}{6} \geq 0$ or $x \geq 1$



(1.5 marks)

6 (b) Given $h(x) = \frac{5x+1}{x-3}$

x-intercept, Put $y = 0$, $x = -1/5$ (0.5 mark)

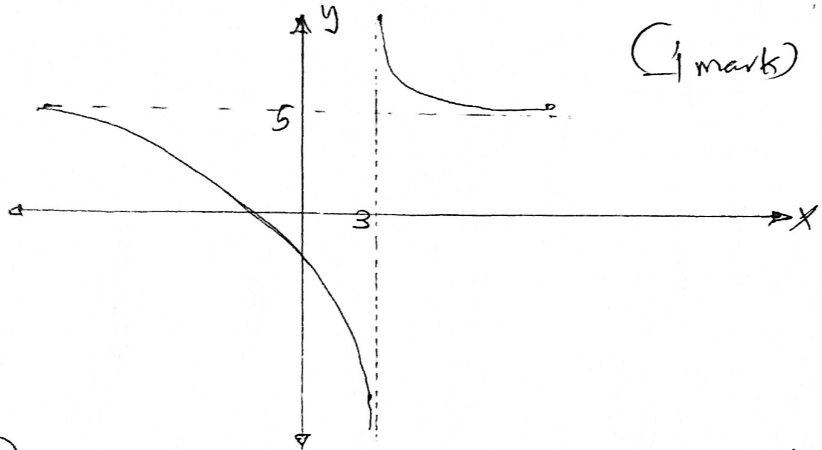
y-intercept, put $x = 0$, $y = -1/3$ (0.5 mark)

Vertical asymptote: $x = 3$ (0.5 mark)

Horizontal asymptotes:

$$y = \lim_{x \to \infty} \left[\frac{5x+1}{x-3}\right] = 5 \quad \text{(0.5 mark)}$$

Graph $h(x) = \frac{5x+1}{x-3}$



(1 mark)

Domain $= \{x : x \in R, x \neq 3\}$ 0.5 mark

Range $=$ $y : y \in R, y \neq 5\}$ 0.5 mark

7. (a) Taylor's theorem state that: If a function $f(x)$ is continous and has x continous derivatives, at $x = a$ then

$$f(x) = f(a) + \frac{(x-a)}{1!}f'(a) + \frac{(x-a)^2}{2!}f''(a) + \frac{(x-a)^3}{3!}f'''(a) + \ldots \quad \text{(1 mark)}$$

Derivation of Newton's - Raphson formula

Truncating higher terms, we get

$$f(x) = f(a) + \frac{(x-a)}{1!}f'(a)$$

If x is the root of a function, $f(x) = 0$ (1 mark)

$$0 = f(a) + (x-a)f''(a)$$

$$x - a = \frac{-f(a)}{f'(a)}$$

$$x = a - \frac{f(a)}{f'(a)} \quad \text{(1 mark)}$$

where a is the value of x closer to the better approximation

7 (b) Given $f(x) = x^2 - 2x - 1 = 0$; $x_0 = 2$ and $x_1 = 3$

$$f(x_0) = 2^2 - 2(2) - 1 = -1$$
$$f(x_1) = 3^2 - 2(3) - 1 = 2$$

Since $f(x)$ has changed sign between $x = 2$ and $x = 3$, then there is a root in the interval

The root of a function $f(x)$ by secant formula are given by

$$x_{n+2} = x_n - \left[\frac{x_{n+1} - x_n}{f(x_{n+1}) + f(x_n)}\right] f(x_n)$$

first iteration; $n = 0$

$$x_2 = x_0 - \left[\frac{x_1 - x_0}{f(x_1) - f(x_0)}\right] f(x_0)$$
$$= 2 - \left[\frac{3-2}{2-(-1)}\right](-1)$$
$$= 7/3 \quad \text{(1mark)}$$

Second iteration; $n = 1$ and $f(x_2) = -2/9$

$$x_3 = x_1 - \left[\frac{x_2 - x_1}{f(x_2) - f(x_1)}\right] f(x_1)$$
$$= 3 - \left[\frac{7/3 - 3}{-2/9 - 2}\right](2)$$
$$= 12/5 \quad \text{(1mark)}$$

Third iteration; $n = 2$ and $f(x_3) = -0.04$

$$x_4 = x_2 - \left[\frac{x_3 - x_2}{f(x_3) - f(x_2)}\right] f(x_2)$$
$$= 7/3 - \left[\frac{12/5 - 7/3}{-0.04 - (-2/9)}\right](-2/9)$$
$$= 2.41463$$

The root of the equation is 2.41463 to four decimal places. (1mark)

(c)

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7 (c) Required to evaluate $\int_0^1 \sqrt{x}\cos x\,dx$

Compare with $\int_a^b f(x)\,dx$

$a = 0$, $b = 1$ and $f(x) = \sqrt{x}\cos x$

Number of ordinates $= 5$ ∴ Number of strips $= 4$

Width of intervals, $h = \frac{b-a}{n} = \frac{1-0}{4} = 0.25$ (0.5 mark)

Table of Values.

n	x_n	$f(x_n)$	$f(x_0)+f(x_4)$	even ordinate	odd ordinate
0	0	0	0		
1	0.25	0.48446			0.48446
2	0.50	0.62054		0.62054	
3	0.75	0.63366			0.63366
4	1.00	0.54030	0.54030		
	TOTAL		0.54030		1.11812

(1 mark)

The approximate value of the integral is given by

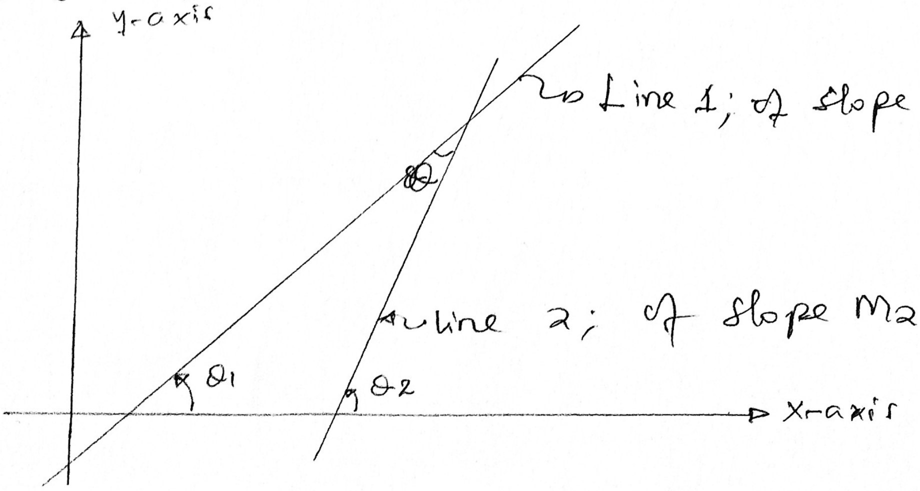
$$\int_0^1 \sqrt{x}\cos x\,dx \approx \frac{h}{3}\left[(f(x_0)+f(x_4)) + 4\sum \text{odd ordinate} + 2\sum \text{even}\right]$$ (0.5 mark)

$$= \frac{0.25}{3}\left[0.54030 + (4\times 1.11812) + (2\times 0.62054)\right]$$

$$= 0.521155$$

$\therefore \int_0^1 \sqrt{x}\cos x\,dx = 0.5212$ to four decimal places (1 mark)

8 (a) (i) Consider the sketch below



(0.5 mark)

8 (a)(i) By angle properties of a triangle

$\theta + \theta_1 = \theta_2$

$\theta = \theta_2 - \theta_1$ (1 mark)

Applying tangent both sides, gives

$\tan\theta = \tan(\theta_2 - \theta_1)$

$= \dfrac{\tan\theta_2 - \tan\theta_1}{1 + \tan\theta_1 \tan\theta_2}$ (0.5 mark)

where $\tan\theta_1 = m_1$, $\tan\theta_2 = m_2$

$\tan\theta = \dfrac{M_2 - M_1}{1 + M_1 M_2}$ (0.5 mark)

(b) (i) Given line: $4y + 5x - 12 = 0$ and point $(x, y) = (6, 8)$

The perpendicular distance is given by

$d = \left| \dfrac{4y + 5x - 12}{\sqrt{4^2 + 5^2}} \right|$ (1 mark)

$d = \left| \dfrac{(4 \times 8) + 5(6) - 12}{\sqrt{41}} \right| = \dfrac{50}{\sqrt{41}}$ Units (1 mark)

(ii) Given: Circle equation $x^2 + y^2 - 4x + 6y - 3 = 0$

Tangent line: $3x - 4y + 7 = 0$

from $x^2 - 4x + y^2 + 6y - 3 = 0$

$(x-2)^2 - 4 + (y+3)^2 - 9 - 3 = 0$

$(x-2)^2 + (y+3)^2 = 16$ (0.5 mark)

Compare with: $(x-a)^2 + (y-b)^2 = r^2$

$\therefore$ Centre of required circle $(a, b) = (2, -3)$ (0.5 mark)

Radius of the required circle is given by

$r = \left| \dfrac{3x - 4y + 7}{\sqrt{3^2 + 4^2}} \right|_{(x,y) = (2,-3)}$

$r = \left| \dfrac{3(2) - 4(-3) + 7}{\sqrt{25}} \right| = \dfrac{25}{5} = 5$ Units (1 mark)

8 (b)(ii) equation of required Circle is given by

$(x-a)^2 + (y-b)^2 = r^2$

$(x-2)^2 + (y+3)^2 = 5^2$

$\therefore\ x^2 + y^2 - 4x + 6y - 12 = 0$ (1 mark)

8 (a) (ii) Given lines : $4x-3y-5=0$ and $2x+y-1=0$

from $4x-3y-5=0$; $2x+y-1=0$

$y = \frac{4}{3}x - 5/3$ $\quad y = -2x+1$

Compare with $y = m_1x + c$ $\quad y = m_2x + c$

$\therefore\ m_1 = 4/3$ and $m_2 = -2$

Angle between the lines is $\tan\theta = \cancel{2x}$

$$\tan\theta = \frac{-2 - 4/3}{1 + (-2)(4/3)}$$

$\theta = -63°26'$

$\therefore$ The acute angle between the lines is $63°26'$

9. (a) Let $I = \int \frac{2x-1}{x^2-8x+15}\,dx$

let $\frac{2x-1}{x^2-8x+15} = \frac{2x-1}{(x-5)(x-3)} = \frac{A}{x-5} + \frac{B}{x-3}$

$2x-1 = A(x-3) + B(x-5)$

Comparing Coefficients, we have

$\begin{cases} A + B = 2 \\ 3A + 5B = 1 \end{cases}$

Hence $A = 9/2$ and $B = -5/2$ (2 marks)

$\therefore\ I = \int \left[\frac{9}{2}\frac{1}{x-5} - \frac{5}{2}\frac{1}{x-5} \right] dx$ (2 marks)

$= 9/2 \ln(x-5) - 5/2 \ln(x-3) + C$

(b)

9 (b) Given $\int_1^3 \frac{\ln x}{\sqrt{x}}\,dx$

Integrating by parts

Let: $u = \ln x$, $dv = x^{-1/2}\,dx$

so that $du/dx = 1/x$, $du = 1/x\,dx$

$v = 2\sqrt{x}$ (1 mark)

$$\int_1^3 \frac{\ln x}{\sqrt{x}}\,dx = 2\sqrt{x}\ln x\Big|_1^3 - 2\int_1^3 x^{1/2}\cdot\frac{1}{x}\,dx$$ (1 mark)

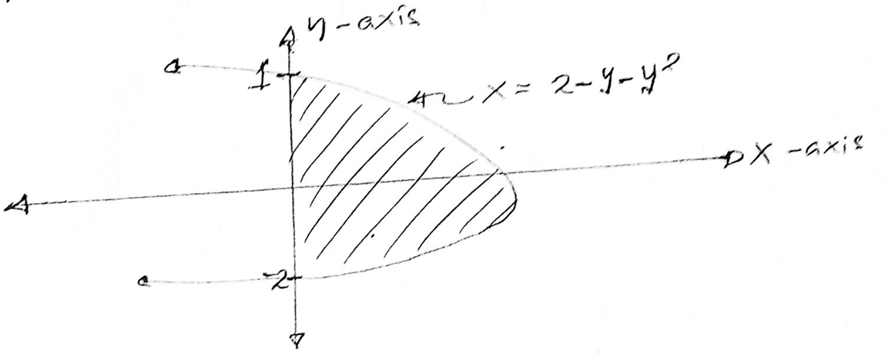
$$= 2\sqrt{x}\ln x - 4\sqrt{x}\Big|_1^3$$

$$= [2\sqrt{3}\ln 3 - 4\sqrt{3}] - [2\sqrt{1}\ln 1 - 4\sqrt{1}]$$ (1 mark)

$$= 0.8775$$

~~10~~ (c) Given: $x = 2 - y - y^2$

when $x = 0$, $y^2 + y - 2 = 0$, $\therefore$ $y = 1$ or $y = -2$



(1mark)

Required area is given by

$$A = \int_{-2}^{1} x\,dy$$

$$= \int_{-2}^{1}(2 - y - y^2)\,dy$$ (1mark)

$$= \left[2y - \frac{y^2}{2} - \frac{y^3}{3}\right]_{-2}^{1}$$

$$= \left[2 - \frac{1}{2} - \frac{1}{3}\right] - \left[-4 - 2 + \frac{8}{3}\right]$$ (1mark)

$$= \frac{9}{2}$$ square units ~~(1 mark)~~

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10 (a) Given u and v are function of x

Let: $f(x) = u/v$ and $f(x+\Delta x) = \dfrac{u+\Delta u}{v+\Delta v}$

from 1st principle

$$\frac{d}{dx}\left(\frac{u}{v}\right) = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \left[\frac{u+\Delta x}{v+\Delta v} - \frac{u}{v}\right]\frac{1}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \left[\frac{v(u+\Delta v) - u(v+\Delta v)}{v(v+\Delta v)}\right]\frac{1}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \left[\frac{uv + v\Delta u - uv - u\Delta v}{v^2 + v\Delta v}\right]\frac{1}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \left[\frac{v\frac{\Delta u}{\Delta x} - u\frac{\Delta v}{\Delta x}}{v^2 + v\Delta v}\right]$$

$$\therefore \frac{d}{dx}\left(\frac{u}{v}\right) = \left[\frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}\right]$$ (3 marks)

(b) (i) Given $y = \log_3 (x^2 + 2x + 1)$ Required to find dy/dx

By laws of logarithm $3^y = x^2 + 2x + 1$

apply natural log both sides

$$\ln 3^y = \ln(x^2 + 2x + 1)$$

$$y \ln 3 = \ln(x^2 + 2x + 1)$$

$$y = \frac{\ln(x^2 + 2x + 1)}{\ln 3}$$

$$\frac{dy}{dx} = \frac{\frac{d}{dx}(x^2 + 2x + 1)}{(x^2 + 2x + 1)\ln 3}$$

$$\frac{dy}{dx} = \frac{2x + 2}{(x^2 + 2x + 1)\ln 3}$$ (2 marks)

10. (b) (ii) Given $y = \dfrac{\cos 3x + \cos x}{\sin 3x - \sin x}$

$= \dfrac{2\cos 2x \cos x}{2\sin x \cos 2x}$ [By factor formula.]

$= \cot x$ (2 marks)

$\therefore dy/dx = -\operatorname{cosec}^2 x$

(c) Given $\sqrt{627} = \sqrt{625+2} = \sqrt{x+dx}$

Let $y = \sqrt{x} = y = x^{1/2}$

$dy/dx = \dfrac{1}{2\sqrt{x}}$

$dy = \dfrac{1}{2\sqrt{x}} dx$

$= \dfrac{1}{2} \dfrac{(2)}{\sqrt{625}} = 0.04$ (1.5 mark)

Value of y $y = \sqrt{x} = \sqrt{625} = 25$

Now $\sqrt{627} = y + dy$

$= 25 + 0.04$

$= 25.04$

$\therefore \sqrt{627} = 25.04$ (1.5 mark)

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