Assignment 2 SET A Submission Form

Faculty	Faculty of Computing and Information Technology
Programme	PRE-CALCULUS
Tutorial Group	5
GROUP	1
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LINK FOR VIDEO:

https://drive.google.com/file/d/18jShfFHxyZd7wSRGVeR8qd5v3tfGBKLS/view?usp=sharing

Q1

a. $(8-2x)^{\frac{1}{3}}$

$= \left[8\left(1-\frac{1}{4}x\right)\right]^{\frac{1}{3}}$

$= 2\left(1-\frac{1}{4}x\right)^{\frac{1}{3}}$

$= 2\left[1 + \frac{1}{3}\left(-\frac{1}{4}x\right) + \frac{\frac{1}{3}\left(\frac{1}{3}-1\right)}{2!}\left(-\frac{x}{4}\right)^2 + \frac{\frac{1}{3}\left(\frac{1}{3}-1\right)\left(\frac{1}{3}-2\right)}{3!}\left(-\frac{x}{4}\right)^3\right]$

$= 2\left[1 - \frac{1}{12}x - \left(\frac{2}{9}\times\frac{1}{2}\times\frac{x^2}{16}\right) + \left(\frac{10}{27}\times\frac{1}{6}\times\frac{-x^3}{64}\right)\right]$

$= 2\left[1 - \frac{1}{12}x - \frac{x^2}{144} - \frac{5x^3}{5184}\right]$

$= 2 - \frac{2}{12}x - \frac{2x^2}{144} \cdot \frac{10x^3}{5184}$

$= 2 - \frac{1}{6}x - \frac{x^2}{72} - \frac{10x^3}{5184}$ #

b. i. $A = 50000 \qquad n = 5\times12 \qquad i = \frac{0.09}{12}$

$= \frac{3}{400}$

$R = \frac{\frac{3}{400}\times 50000}{1-\left(1+\frac{3}{400}\right)^{-60}}$

$= \frac{375}{0.3613}$

$= RM1037.92$

ii. $1037.92\times 60 = RM62275.20$

$62275.20 - 50000 = RM12275.2$ #

2(i) $f(x) = \frac{2x+3}{x^2-4}$

$\frac{2x+3}{(x-2)^2} = \frac{A}{(x-2)} + \frac{Bx+C}{(x+2)}$

$2x+3 = A(x+2) + Bx+C(x-2)$

$2x+3 = Ax + 2A + Bx^2 - 2Bx + Cx - 2C$

$2x+3 = Bx^2 + Ax - 2Bx + Cx + 2A - 2C$

$B x^2, B=0 \quad X, 2 = A-2B+C \qquad \cancel{\text{by}} \; 3 = 2A-2C$

$2 = A-2(0)+C \qquad 2C = 2A-3$

$A+C = 2 \qquad C = \frac{2A-3}{2}$

$2A+2A-3 = 4 \qquad C = \frac{14-12}{8}$

$4A = 7 \qquad C = \frac{1}{4}$

$A = \frac{7}{4}$

$\therefore \frac{2x+3}{(x-2)^2} = \frac{7}{4(x-2)} + \frac{1}{4(x+2)}$

(ii) $f(x) = \frac{2x+3}{x^2-4}$

find $x = x^2-4$

$x^2-4 = 0$

$x^2 = 4$
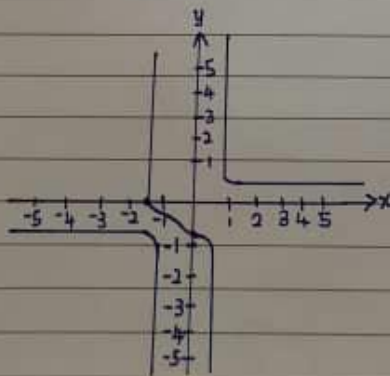
$x = \pm 2 \qquad \therefore$ Vertical asymptote $x=2, x=-2$

Horizontal asymptote $y=0$

(iii)

if $x=0, f(0) = \frac{2(0)+3}{(0)^2-4}$

$\quad = -\frac{3}{4} \quad (0, -\frac{3}{4})$

$f(x) = 0$

$f(x) = \frac{2x+3}{x^2-4}$

$0 = \frac{2x+3}{x^2-4}$

$0 = 2x+3$

$x = -\frac{3}{2}$

$(-\frac{3}{2}, 0)$

b) $\dfrac{\sin 5\alpha + \sin \alpha}{\cos 5\alpha + \cos \alpha}$

$= \dfrac{2 \sin \frac{1}{2}(5\alpha + \alpha)\cos \frac{1}{2}(5\alpha - \alpha)}{\cos 5\alpha + \cos \alpha}$

$= \dfrac{2 \sin \left(\frac{6\alpha}{2}\right)\cos \left(\frac{4\alpha}{2}\right)}{\cos 5\alpha + \cos \alpha}$

$= \dfrac{2 \sin 3\alpha \cos 2\alpha}{\cos 5\alpha + \cos \alpha}$

$= \dfrac{2 \sin 3\alpha \cos 2\alpha}{2\cos \frac{1}{2}(5\alpha + \alpha)\cos \frac{1}{2}(5\alpha - \alpha)}$

$= \dfrac{2 \sin 3\alpha \cos 2\alpha}{2 \cos \left(\frac{6\alpha}{2}\right)\cos \left(\frac{4\alpha}{2}\right)}$

$= \dfrac{\cancel{2} \sin 3\alpha \cancel{\cos 2\alpha}}{\cancel{2} \cos 3\alpha \cancel{\cos 2\alpha}}$

$= \dfrac{\sin 3\alpha}{\cos 3\alpha}$

$= \tan 3\alpha$ ⨯

$\sin x + \sqrt{3}\cos x = 1$

$\left(\sin x = 1 - \sqrt{3}\cos x\right)^2$

$\sin^2 x = 1^2 - 2\sqrt{3}\cos x + 3\cos^2 x$

$1 - \cos^2 x = 1 - 2\sqrt{3}\cos x + 3\cos^2 x$

$2\sqrt{3}\cos x = 4\cos^2 x$

$2\sqrt{3} = \dfrac{4\cos^2 x}{\cos x}$

$2\sqrt{3} = 4\cos x$

$\dfrac{^2 4\cos x}{} = \dfrac{\cancel{2}\sqrt{3}}{}$

$\cos x = \dfrac{\sqrt{3}}{2}$ $\begin{bmatrix} \alpha\,I & \,\,\pi \\ x & ,180 - \alpha \end{bmatrix}$

$x = 30°, 150°$ ⨯⨯

b) $\dfrac{1}{2}\sin x + \dfrac{\sqrt{3}}{2}\cos x$

$= (\cos 60°)\sin x + (\sin 60°)\cos x$

$= \sin(60 + x)$

$= \sin(x + 60°)$ ⨯

Assignment 2 Section A

Question 3

(a)

$$M = \begin{bmatrix} 5 & 2 & -3 \\ 2 & 5 & 1 \\ -3 & 9 & -1 \end{bmatrix}$$

$$|M| = 5[5(-1)-1(9)] - 2[2(-1)-1(-3)] + (-3)[2(9)-5(-3)]$$

$$= 5(-14) - 2(1) + (-3)(33)$$

$$= -171$$

(b)

$$M^T = \begin{bmatrix} 5 & 2 & -3 \\ 2 & 5 & 9 \\ -3 & 1 & -1 \end{bmatrix}$$

$$\text{adj } M = \begin{bmatrix} +\begin{vmatrix} 5 & 9 \\ 1 & -1 \end{vmatrix} & -\begin{vmatrix} 2 & 9 \\ -3 & -1 \end{vmatrix} & +\begin{vmatrix} 2 & 5 \\ -3 & 1 \end{vmatrix} \\ -\begin{vmatrix} 2 & -3 \\ 1 & -1 \end{vmatrix} & +\begin{vmatrix} 5 & -3 \\ -3 & -1 \end{vmatrix} & -\begin{vmatrix} 5 & 2 \\ -3 & 1 \end{vmatrix} \\ +\begin{vmatrix} 2 & -3 \\ 5 & 9 \end{vmatrix} & -\begin{vmatrix} 5 & -3 \\ 2 & 9 \end{vmatrix} & +\begin{vmatrix} 5 & 2 \\ 2 & 5 \end{vmatrix} \end{bmatrix}$$

$$= \begin{bmatrix} -14 & -25 & 17 \\ -1 & -14 & 11 \\ 33 & -51 & 21 \end{bmatrix}$$

(c)

$$M^{-1} = -\frac{1}{171}\begin{bmatrix} -14 & -25 & 17 \\ -1 & -14 & -11 \\ 33 & -51 & 21 \end{bmatrix}$$

$$= \begin{bmatrix} \dfrac{14}{171} & \dfrac{25}{171} & -\dfrac{17}{171} \\ \dfrac{1}{171} & \dfrac{14}{171} & \dfrac{11}{171} \\ -\dfrac{11}{57} & \dfrac{17}{57} & -\dfrac{7}{57} \end{bmatrix}$$

$$\begin{bmatrix} 5 & 2 & -3 \\ 2 & 5 & 1 \\ -3 & 9 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ -4 \\ 5 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = -\frac{1}{171} \begin{bmatrix} -14 & -25 & 17 \\ -1 & -14 & -11 \\ 33 & -51 & 21 \end{bmatrix} \begin{bmatrix} 1 \\ -4 \\ 5 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = -\frac{1}{171} \begin{bmatrix} 171 \\ 0 \\ 342 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -1 \\ 0 \\ -2 \end{bmatrix}$$