MATH110 ASSIGNMENT

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SECTION:09
SET:C

1. $\lim_{t \to \frac{-1}{2}} \dfrac{4t^2 - 1}{4t^2 + 8t + 3}$

$= \lim_{t \to \frac{-1}{2}} \dfrac{(2t)^2 - 1}{4t^2 + 6t + 2t + 3}$

$= \lim_{t \to \frac{-1}{2}} \dfrac{(2t - 1)(2t + 1)}{2t(2t + 3) + 1(2t + 3)}$

$= \lim_{t \to \frac{-1}{2}} \dfrac{(2t - 1)(2t + 1)}{(2t + 3)(2t + 1)}$

$= \lim_{t \to \frac{-1}{2}} \dfrac{(2t - 1)}{(2t + 3)}$

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

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

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

$= -1(\text{Ans})$

2. $\lim_{y \to 4} \dfrac{4 - y}{2 - \sqrt{y}}$

$= \lim_{y \to 4} \dfrac{2^2 - (\sqrt{y})^2}{2 - \sqrt{y}}$

$= \lim_{y \to 4} \dfrac{(2 - \sqrt{y})(2 + \sqrt{y})}{(2 - \sqrt{y})}$

$= \lim_{y \to 4} 2 + \sqrt{y}$

$= 2 + \sqrt{4}$

$= 2 + 2$

$= 4(\text{Ans})$

3.(a) $\lim_{x\to 1} \dfrac{x^2+6x-7}{x^2-1}$

$= \lim_{x\to 1} \dfrac{x^2+7x-x-7}{(x+1(x-1)}$

$= \lim_{x\to 1} \dfrac{(x+7)(x-1)}{(x+1(x-1)}$

$= \lim_{x\to 1} \dfrac{x+7}{x+1}$

$= \dfrac{1+7}{1+1}$

$= \dfrac{8}{2}$

$= 4$(Ans)

3.(b) $\lim_{x\to 0} \dfrac{\sqrt{1-2x^2}-\sqrt{1+2x^2}}{x^2}$

$= \lim_{x\to 0} \dfrac{(\sqrt{1-2x^2}-\sqrt{1+2x^2})(\sqrt{1-2x^2}+\sqrt{1+2x^2})}{x^2(\sqrt{1-2x^2}+\sqrt{1+2x^2})}$

$= \lim_{x\to 0} \dfrac{(\sqrt{1-2x^2})^2-(\sqrt{1+2x^2})^2}{x^2(\sqrt{1-2x^2}+\sqrt{1+2x^2})}$

$= \lim_{x\to 0} \dfrac{1-2x^2-1-2x^2}{x^2(\sqrt{1-2x^2}+\sqrt{1+2x^2})}$

$= \lim_{x\to 0} \dfrac{-4x^2}{x^2(\sqrt{1-2x^2}+\sqrt{1+2x^2})}$

$= \lim_{x\to 0} \dfrac{-4}{(\sqrt{1-2x^2}+\sqrt{1+2x^2})}$

$= \dfrac{-4}{\sqrt{1-2(0)^2}+\sqrt{1+2(0)^2}}$

$= \dfrac{-4}{1+1}$

$= \dfrac{-4}{2}$

$= -2(\text{Ans})$

3.(c) $\lim_{x\to\infty} \dfrac{x^4+2x^2+1}{2x^4-3x^3+x}$

$= \lim_{x\to\infty} \dfrac{\frac{x^4}{x^4}+\frac{2x^2}{x^4}+\frac{1}{x^4}}{\frac{2x^4}{x^4}-\frac{3x^3}{x^4}+\frac{x}{x^4}}$

$= \lim_{x\to\infty} \dfrac{1+\frac{2}{x^2}+\frac{1}{x^4}}{2-\frac{3}{x}+\frac{1}{x^3}}$

$= \dfrac{1+0+0}{2-0+0}$

$= \dfrac{1}{2}$(Ans)

4. $\lim_{x\to 2} \dfrac{x^2+4x-12}{x^2-4}$

$= \lim_{x\to 2} \dfrac{x^2+6x-2x-12}{x^2-2^2}$

$= \lim_{x\to 2} \dfrac{(x+6)(x-2)}{(x+2)(x-2)}$

$$= \lim_{x \to 2} \frac{x+6}{x+2}$$

$$= \frac{2+6}{2+2}$$

$$= \frac{8}{4}$$

$$= 2(\text{Ans})$$

5. $\lim_{x \to -2} \frac{3x^2 + ax + a + 3}{x^2 + x - 2}$

Now, x=-2 in the numerator
$3(-2)^2 + a(-2) + a + 3 = 0$
or, $12 - 2a + a + 3 = 0$
or, $15 - a = 0$
so, a = 15

$$\lim_{x\to -2} \frac{3x^2+15x+15+3}{x^2+x-2}$$

$$= \lim_{x\to -2} \frac{3x^2+15x+18}{x^2+x-2}$$

$$= \lim_{x\to -2} \frac{3(x^2+5x+6)}{x^2+x-2}$$

$$= \lim_{x\to -2} \frac{3(x^2+3x+2x+6)}{x^2+2x-x-2}$$

$$= \lim_{x\to -2} \frac{3(x+3)(x+2)}{(x+2)(x-1)}$$

$$= \lim_{x\to -2} \frac{3(x+3)}{x-1}$$

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

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

$$= -1(\text{Ans})$$