

Date:

Sub:

المناهج في التفاضل

$$\text{أ)} \lim_{x \rightarrow 1^+} \frac{2x+3}{x+1} = \frac{4}{2} = 2$$

وال

$$\text{ب)} \lim_{x \rightarrow 1^-} \frac{2x+3}{x+1} = \frac{4}{2} = 2$$

$$\text{ج)} \lim_{x \rightarrow 1} \frac{2x+3}{x+1} = \frac{4}{2} = 2$$

$$\text{د)} \lim_{x \rightarrow 0} \frac{2x+3}{[x^2]} = \frac{3}{0^+} = +\infty$$

$$\text{هـ)} \lim_{x \rightarrow 1^-} f(x) - 1 = f(1) - 1 = 4$$

وال

$$\text{و)} \lim_{x \rightarrow 1^-} [2x - 1] = \lim_{x \rightarrow 1^-} [1^- - 1] = \lim_{x \rightarrow 1^-} [1^-] = 4$$

$$\text{ز)} \left[\lim_{x \rightarrow 1^-} 2x - 1 \right] = \left[\lim_{x \rightarrow 1^-} (1^- - 1) \right] = 1$$

$$\text{ح)} \left[\lim_{x \rightarrow 1^+} 2x - 1 \right] = \left[\lim_{x \rightarrow 1^+} (1^+ - 1) \right] = 1$$

$$\text{ط)} \lim_{x \rightarrow 1^-} \frac{f(x)+1}{x} = \frac{f(1)+1}{1} = \frac{5}{1}$$

وال

$$\text{ي)} \lim_{x \rightarrow 1^-} \left[\frac{f(x)+1}{x} \right] = \left[\frac{f(1^-)+1}{1} \right] = \left[\frac{1^-}{1} \right] = 1$$

$$\text{ك)} \left[\lim_{x \rightarrow 1^-} \frac{f(x)+1}{x} \right] = \left[\lim_{x \rightarrow 1^-} \frac{f(1^-)+1}{1} \right] = \infty$$

$$\text{ل)} \left[\lim_{x \rightarrow 1^+} \frac{f(x)+1}{x} \right] = \left[\lim_{x \rightarrow 1^+} \frac{f(1^+)+1}{1} \right] = \infty$$

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الف) $\lim_{x \rightarrow 1} \frac{x-1}{x^2-2x+1} = \lim_{x \rightarrow 1} \frac{x-1}{(x-1)(x-1)} = \lim_{x \rightarrow 1} \frac{1}{x-1}$ سوال ۴

$\begin{matrix} 1^+ \\ \swarrow \\ 1^- \end{matrix}$
 $\frac{1}{0^+} = +\infty$
 $\frac{1}{0^-} = -\infty$

حد ندارد

$\frac{1}{-1^+}$
 $\frac{1}{-1^-}$

ب) $\lim_{x \rightarrow 3} \frac{x-3}{x^2-2x+4} = \lim_{x \rightarrow 3} \frac{x-3}{(x-3)^2}$

$\begin{matrix} 3^+ & \frac{x-3}{0^+} = -\infty \\ 3^- & \frac{-1}{0^+} = -\infty \end{matrix} \left\{ \begin{matrix} -\infty \\ -\infty \end{matrix} \right.$

الف) $\lim_{x \rightarrow -3} [-3x] - [5x]$

$\nearrow -9$ $\searrow -15$

$(-3)^+ \rightarrow 1 - (-15) = 16$
 $(-3)^- \rightarrow 4 - (-12) = 16$

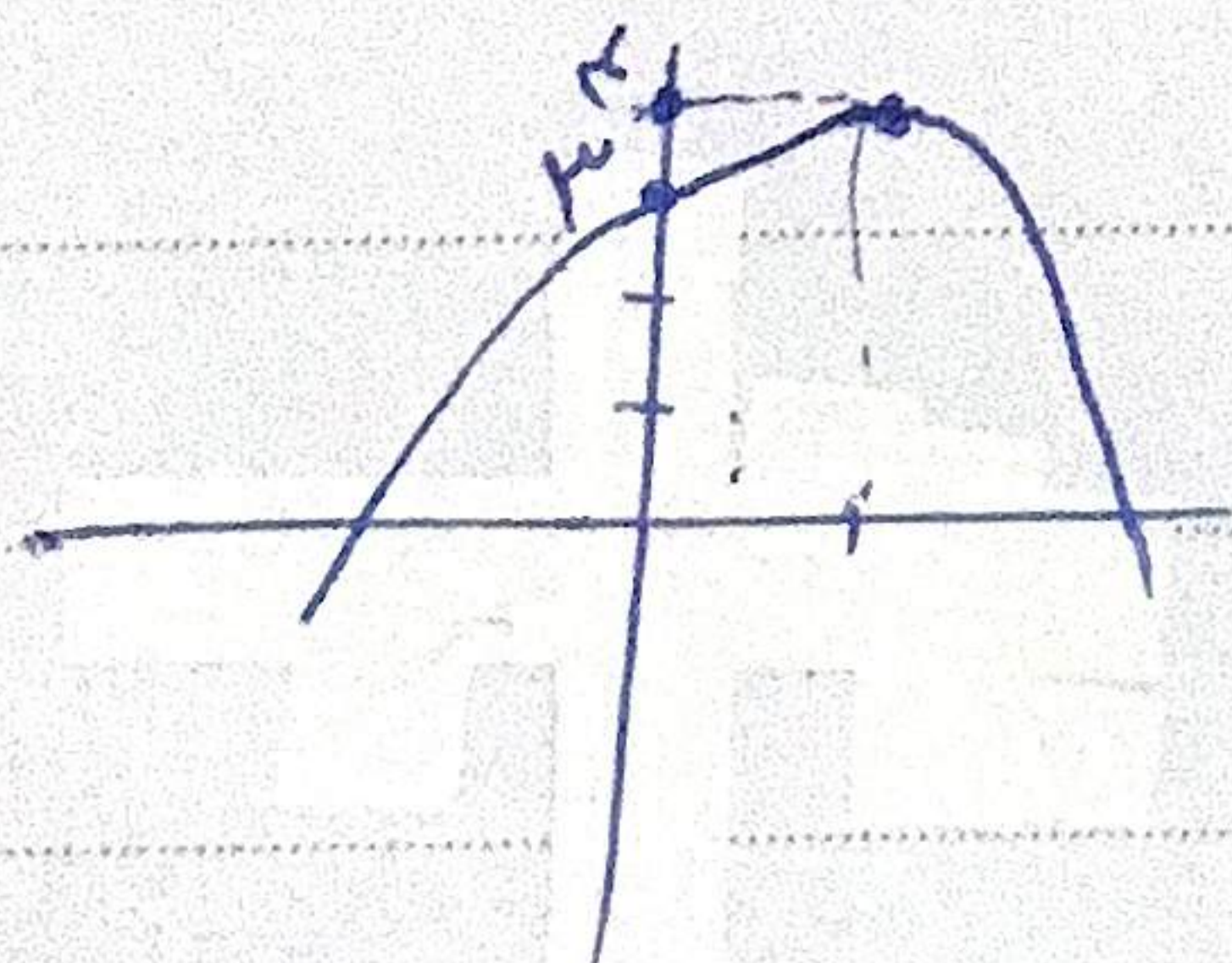
ب) $\lim_{x \rightarrow (-1/4)^-} \left[\frac{-1}{x^4} \right] = -12$

$x < -\frac{1}{4} \rightarrow x^4 < \frac{1}{16} \rightarrow \frac{1}{x^4} > 16$
 $\rightarrow \frac{-1}{x^4} < -16 \rightarrow \left[\frac{-1}{x^4} \right] = -12$

الف) $\lim_{x \rightarrow 1} [-3x^4 + 4x^3 + 3] = 3$

سوال ۱

$\rightarrow$ از عبارت داخل براکت مستخرج کنیم
 $-12x^3 + 12x^2 \xrightarrow{\text{تقسیم بر } (x-1)} -12x^2(x-1)$

حالی $x=1$ ، y کمتر از ۳ است

ب) $\lim_{x \rightarrow 0} [-3x^4 + 4x^3 + 3]$

$\begin{matrix} 0^+ \rightarrow [3^+] = 3 \\ 0^- \rightarrow [3^-] = 3 \end{matrix}$

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ii) $\lim_{x \rightarrow r} \frac{|x^r - 1|}{x^r - 1}$

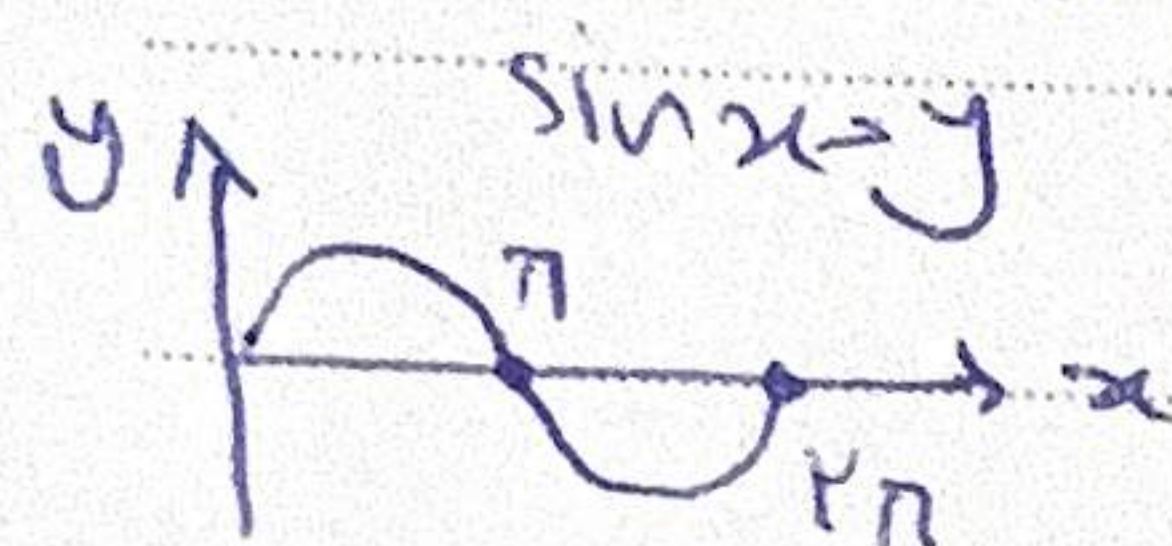
$r^+ \rightarrow \frac{(x-r)(x^r + \epsilon + rx)}{(x-r)(x+r)} = r$
 $r^- \rightarrow \frac{-(x-r)(x^r + \epsilon + rx)}{(x-r)(x+r)} = -r$

$x^r - 1 = (x-r)(x^r + \epsilon + rx)$
 $\frac{r}{-d+}$

سوال ۷

iii) $\lim_{x \rightarrow \pi} \frac{|\sin x|}{\sin 2x}$

$\pi^+ \rightarrow \frac{-\sin x}{\sin 2x} = \frac{-1}{r \cos x} = \frac{-1}{r(-1)} = \frac{1}{r}$
 $\pi^- \rightarrow \frac{+\sin x}{\sin 2x} = \frac{1}{r \cos x} = \frac{1}{r(-1)} = -\frac{1}{r}$



iv) $\lim_{x \rightarrow \frac{3\pi}{2}} \sqrt{\cos x}$

$\frac{3\pi}{2}^- \rightarrow 0^-$
 $\frac{3\pi}{2}^+ \rightarrow 0^+$

سوال ۸

v) $\lim_{x \rightarrow 0} \sqrt{x - 2\sqrt{x}}$

$0^- \rightarrow 0^-$
 $0^+ \rightarrow 0^+$

$\sqrt{x} \rightarrow x > 0$ ①
 $\sqrt{x - 2\sqrt{x}} \rightarrow x - 2\sqrt{x} > 0 \rightarrow \sqrt{x}(\sqrt{x} - 2) > 0 \rightarrow \sqrt{x} > 2 \rightarrow x > 4$ ②

① $\cap$ ② = $[4, +\infty) = 1$

vi) $\lim_{x \rightarrow 0^+} \frac{(-1)^{\lfloor \sin x \rfloor}}{x^r - x^r} = \lim_{x \rightarrow 0^+} \frac{(-1)^0}{x^r(x-1)} = \lim_{x \rightarrow 0^+} \frac{1}{x^r(x-1)} = \frac{1}{0^-} = -\infty$

سوال ۹

$x^r(x-1) > 0$
 $\frac{1}{-d-4+}$

vii) $\lim_{x \rightarrow r} \frac{x^r - [x^r]}{x - [x]}$

$r^+ \rightarrow \frac{x^r - \epsilon}{x - r} = \frac{(x+r)(x-r)}{(x-r)} = x+r = \epsilon$
 $r^- \rightarrow \frac{x^r - r}{x - r} = \frac{1}{1} = 1$

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الف) $y = -x^4 + 4x^3 + 2$

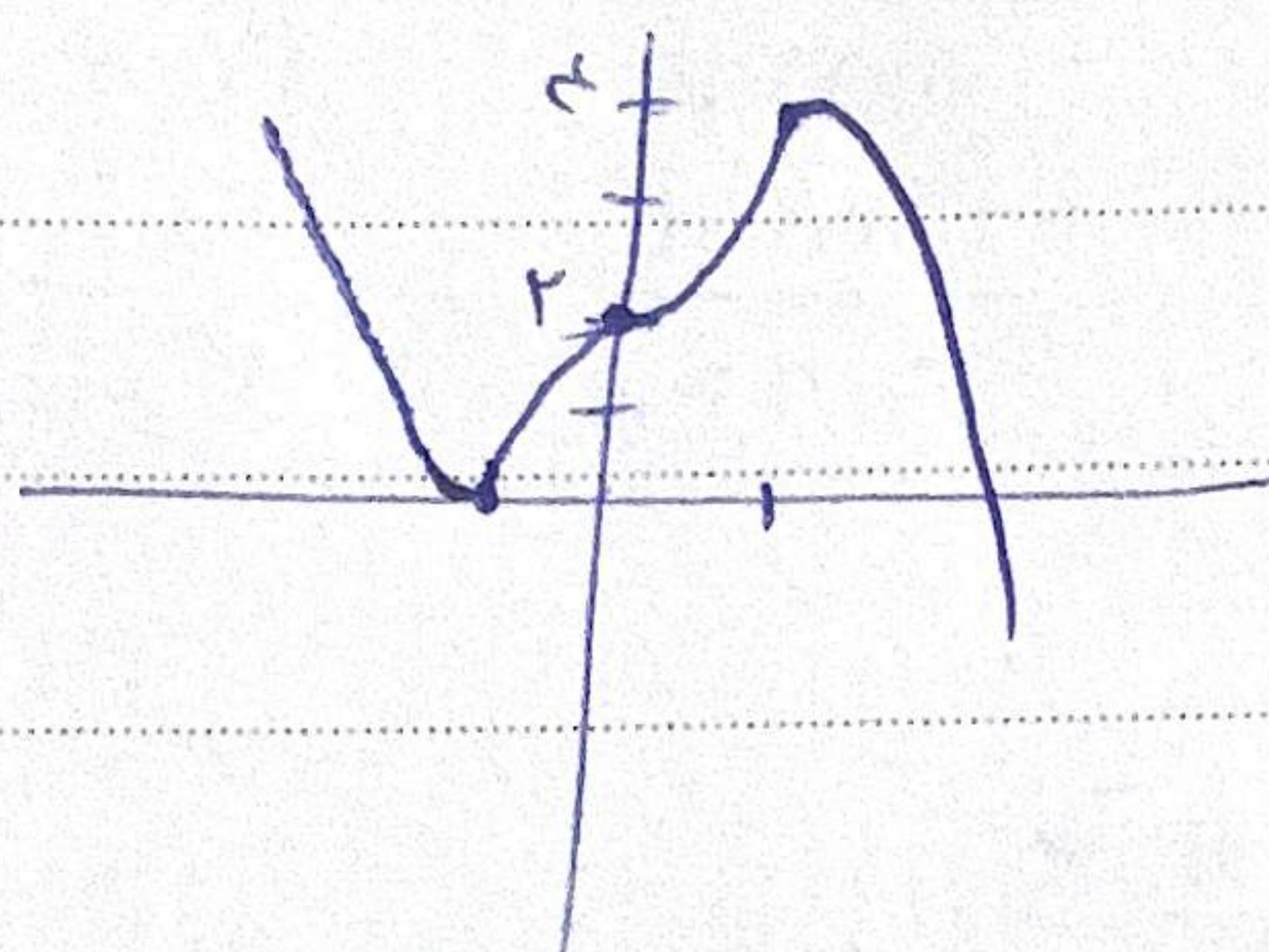
سوال 1

$$y' = -4x^3 + 12x^2 = -4x^2(x-3) = -4x^2(x+1)(x-1)$$

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$$\begin{array}{c} -1 \quad * \quad 1 \\ \hline - \quad + \quad + \quad - \end{array}$$

$$f(1) = 5, f(-1) = 0, f(0) = 2$$



ب) $y = x^4 - 2x^3 + 3$ $y' = 4x^3 - 6x^2 = 2x^2(2x-3) = 2x^2(x-1)(x+1)$

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$$\begin{array}{c} -1 \quad * \quad 1 \\ \hline - \quad + \quad - \quad + \end{array}$$

$$f(1) = 2, f(0) = 3, f(-1) = 2$$

