پوهام براتی

Subject :   Date :

۱) الف) $y = (x - 2[\frac{x}{2}])^2 = 4(\frac{x}{2} - [\frac{x}{2}])^2$ و $0 \leq \frac{x}{2} - [\frac{x}{2}] < 1$

$0 \leq 4x < 4 \Rightarrow R = [0, 4)$

$\sin x - \log y - 4 = 0 \rightarrow \log y = \sin x + 4 \rightarrow 3 \leq \sin x + 4 \leq 5$

$3 \leq \log y \leq 5 \rightarrow \log^3 \leq \log y \leq \log^5 \rightarrow R = (10^3, 10^5]$

۲) $\sqrt{\frac{x^2 - 4}{x^2 - 9}}$ $\left.\begin{array}{l} \max x = +\infty \\ \min x = 0 \end{array}\right\}$ $\max = 1$, $\min = \frac{4}{9}$ $\Rightarrow (-\infty, \frac{4}{9}] \cup (1, +\infty)$

$[0, \frac{2}{3}] \cup (1, +\infty) \Rightarrow \frac{\infty}{3}$

۳) الف) $f(x) = x + \frac{1}{x} + 2\sqrt{x + \frac{1}{x}} \rightarrow D_f = (0, +\infty) \Rightarrow$

$x + \frac{1}{x} \geq 2 \Rightarrow 2 + 2\sqrt{2} = \min$, $+\infty = \max$ $R = [2 + 2\sqrt{2}, +\infty)$

ب) $y = (3 - \sin x)(1 + \sin x) = 3 + 3\sin x - \sin x - \sin^2 x =$

$2\sin x - \sin^2 x + 3$ $\sin x = 1 \rightarrow x = 4$ $1 = \frac{-b}{2a} \Rightarrow x = 4$

$\sin = -1 \rightarrow x = 4$

$R_y = [0, 4]$

۴) $f(x) = -\frac{1}{3}x + 10$ $D_f = \{1, 2, \dots, 9\}$ $f(1) = \frac{29}{3}$

$\left.\begin{array}{l} \frac{n}{2}(2x + (n-1)d) \\ \frac{n}{2}(x_1 + x_n) \end{array}\right\}$ $\frac{225}{3} = 75$ $f(2) = \frac{28}{3}$ $\frac{21}{3}$

۵) $f(x) = \sqrt{ax^2 + bx + c}$ $D_f = [2, +\infty)$

$x = 2 \Rightarrow 2b + c = 0$ $x = 3 \Rightarrow 3b + c = 1$ $b > 0$ و $a = 0$

$\Rightarrow g = ax + b$

$b = 1$, $c = 2$ $g(x) = \sqrt{x^2 + x}$

$\rightarrow \min = 2 \rightarrow R = [2, +\infty)$

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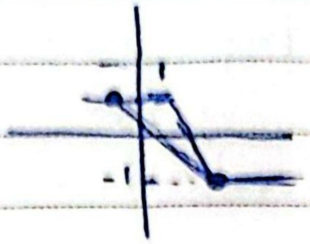
$|x + x| - |x - 1| + ۲x \to x = ۲, 1$

$f(۲) = -1 \to ۲x = -1 \to x = -\frac{1}{۲}$



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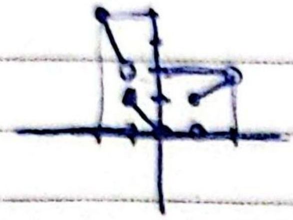

$f(x) \Rightarrow -۲ \leq x < -1 \Rightarrow y = -۲x \Rightarrow ۴, ۲$

$f(x) \Rightarrow -1 \leq x < 0 \Rightarrow y = -x \Rightarrow 1, 0$

$f(x) \Rightarrow 0 \leq x < 1 \Rightarrow y = 0$

$f(x) \Rightarrow 1 \leq x < ۲ \Rightarrow y = x \Rightarrow 1, ۲$

$R_f = [0, ۴] - \{۲\}$

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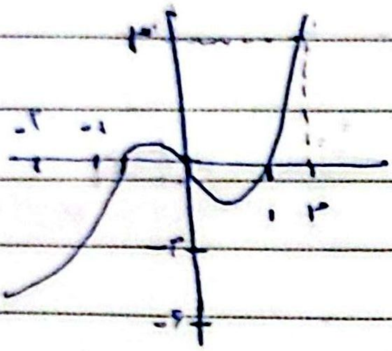

$f(x) \to x \geq 0 \to x^۲ - x$

$f(x) \to x < 0 \to -x^۲ + x$

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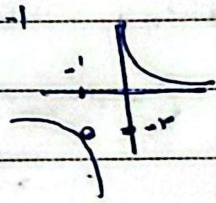
$\frac{1}{x} + \frac{1}{x+1} + \frac{1}{x^۲ + x} = \frac{۲(x+1)}{x(x+1)} = \frac{۲}{x} \to x \neq 0, -1$

$R_y = R - \{0, ۲\}$



(۹

$f(x) = \frac{(\sqrt{x} - 1)(\sqrt{x} - ۳)}{(\sqrt{x} - 1)(\sqrt{x} - 1)} = \frac{\sqrt{x} - ۳}{\sqrt{x} - 1}$

$\min \sqrt{x} \xrightarrow{0} ۳$

$\max \sqrt{x} \xrightarrow{+\infty} 1$

$R_f = (-\infty, 1) \cup (۳, +\infty)$

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$f(x) = \frac{x^۳ + ۲x^۲ - x - ۲}{x^۲ - 1} = \frac{(x-1)(x+1)(x+۲)}{(x+1)(x-1)} = x + ۲$

$x \neq ۹$

$x = R - \{1, ۳\}$

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