Subject
Date : Year Month Day

۱۸۱۵

۱- برد توابع زیر را بیابید و کنید؟

$y = x^2 - 5 \quad -x^2 = -y - 5 \to x^2 = y + 5$

$x = \pm\sqrt{y+5} \quad y+5 \geq 0 \quad y \geq -5 \quad R_f = [-5, \infty)$

$y = x^3 + 1 \quad -x^3 = -y + 1 \to +x^3 = y - 1 \to x = \sqrt[3]{y-1} \to D_f = R$

(۳)

$y = x^2 - 4x + 4 \to x^2 - 4x + 4 + 2 \to y = (x-2)^2 + 2 \to y - 2 = (x-2)^2$

(۴)

$\pm\sqrt{y-2} = x - 2 \to x = \pm\sqrt{y-2} + 2$

$y - 2 \geq 0 \to y \geq 2 \to R_f = [2, +\infty)$

$y = x^2 - 5x + 1 \to \frac{-5}{2} \to \left(\frac{-5}{2}\right)^2 = \frac{25}{4} \quad 5x + \frac{25}{4} + 1 - \frac{25}{4} \to \left[-\frac{21}{4}, +\infty\right)$

R_f

(۵)

$y = \frac{x^2+2}{x^2-2} \quad x^2 + 2 = yx^2 - 2y \to x^2 - yx^2 = -2 - 2y \quad x^2(1-y) = -2 - 2y$

$x^2 = \frac{-2-2y}{1-y} \to x = \pm\sqrt{\frac{2+2y}{1-y}} \to 1 - y > 0 \to y < 1$

$2y \geq -2 \quad y \geq \frac{-2}{2}$

$R_f = [-1, 1)$

$y = \frac{2|x|+1}{|x|-3} \to 2|x| + 1 = y|x| - 3y \quad |x|(2-y) = -1 - 3y$

$2|x| - y|x| = -1 - 3y \to |x| = \frac{1+3y}{2-y} \to \frac{-1}{3}$

$2 - y \to 2$

$-x+1$

$R_f = \left(-\infty, -\frac{1}{3}\right] \cup [2, +\infty)$

(۶)

$y = \frac{1}{x^2 - 3x} \quad 1 = yx^2 - 3yx \to yx^2 - 3yx - 1 = 0$

$\Delta = 9y^2 + 4y \to 9y^2 + 4y \geq 0$

$x = \frac{3y \pm \sqrt{9y^2+4y}}{2y} \to 9y^2 + 4y \geq 0 \to y(9y+4) \geq 0$

$9y + 4 \geq 0 \to 9y \geq -4 \to y \geq \frac{-4}{9}$

$\frac{-4}{9} \quad 0$

$- \quad + \quad +$

$R_f = \left[-\frac{4}{9}, 0\right) \cup (0, +\infty)$

parsian

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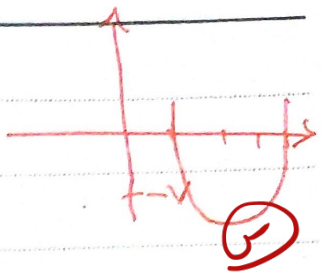
min ست / برد $\to [-V+\infty)$ سهمی سیگنال

min

$y = x^2 - 4x + 2$ $\quad \frac{-b}{2a} = \frac{4}{2} = 2$ $\quad 9-V$ $\quad \begin{bmatrix} 2 \\ -V \end{bmatrix}$

$(2)^2 - 4(2) + 2$

$9 - 18 + 2 \to -V$



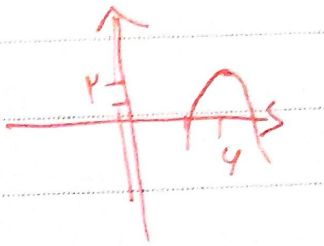
max

$y = -x^2 + 6x + 2$ $\quad \frac{-b}{2a} \quad \frac{-6}{-2} = 3$ $\quad \begin{bmatrix} 3 \\ 9 \end{bmatrix}$

$-(3)^2 + 18 + 2$

$-9 + 18 + 2 = 9$

برد = max $\to (-\infty, 9]$



5

Min

$y = \sqrt{x^2 - 4x + 2}$ $\quad \frac{+4}{2} = \begin{bmatrix} +2 \\ -2 \end{bmatrix} \to$ $Rf \to [0, +\infty)$

Max

$y = \sqrt{-x^2 + 6x + 16} \to \frac{-6}{-2} \neq \begin{bmatrix} 2 \\ 18 \end{bmatrix}$ $Rf = (-\infty, 18] \to [0, \sqrt{18}]$ (۳)

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(۳)

$y = x^3 + 3x^2 + 2x + 1 \to Rf = \mathbb{R}$

اگر توان زوج شد برد $\mathbb{R}$ نیست

$y = \sqrt{x^4 + 6x^2 + 4x + 1} \to Rf = [0, +\infty)$

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$y = \frac{3x+1}{x-2}$ کسری افتاد

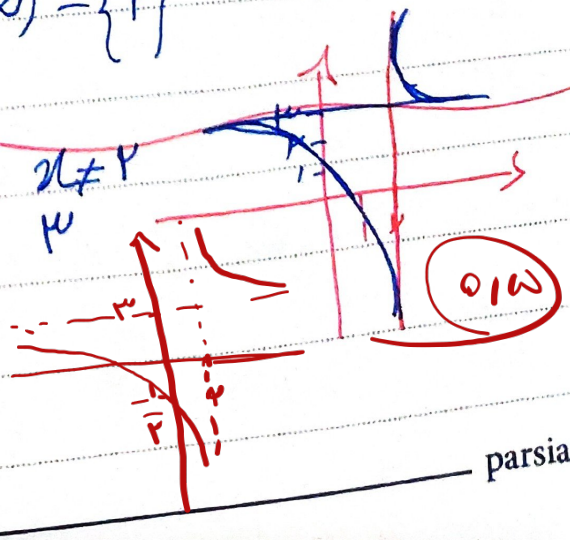
$Rf = \mathbb{R} - \left\{\frac{a}{c}\right\} \to Rf = \mathbb{R} - \{3\}$ (۳)

$\frac{a}{c} = \frac{6}{2} = 3$

$y = \sqrt{\frac{6x+1}{x+3}}$ $\quad$ +تساوی $\to$

$Rf = [0, +\infty) - \{3\}$

$y = \frac{3x+1}{x-2}$ مجانب عمودی $x \neq 2$ (ریشه مخرج) مجانب افقی $\frac{a}{c}$ $\quad \frac{3}{1}$



(۳)

$x = 0 \to y = \frac{-1}{2}$

parsian

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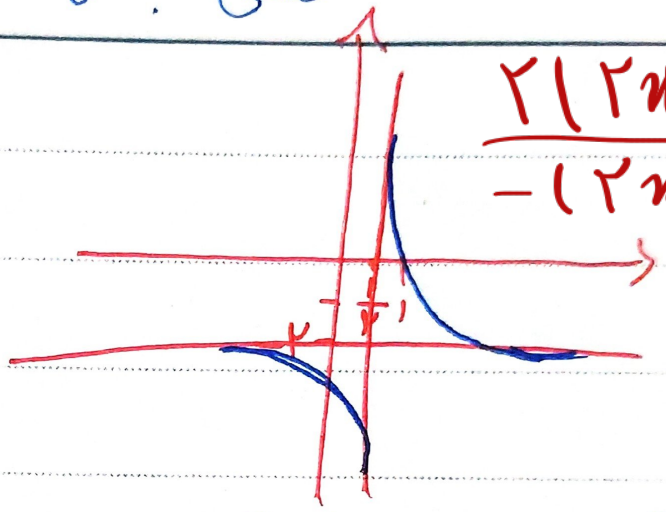
$y = \frac{\varepsilon x - ۲}{۱ - ۲x}$ $x \neq \frac{۱}{۲}$

$\frac{۴}{-۲} = -۲$

خط مجانب افقی است

$\frac{۲(۲x-۱)}{-(۲x-۱)} = -۲$



الف) $y = \cos^۲ x + \frac{۱}{\cos^۲ x} \rightarrow a^۲ + \frac{۱}{a^۲} \rightarrow Rf = [۲, +\infty)$ (۲)

ب) $y = \sqrt[۳]{\frac{x^۲+۱}{x}} \rightarrow \sqrt[۳]{x + \frac{۱}{x}} \rightarrow Rf = (-\infty, \sqrt[۳]{۲}] \cup [\sqrt[۳]{۲}, +\infty)$