Subject

Date : Year Month Day

۱) برد توابع زیر را حساب کنید.

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

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

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

$y=x^2-4x+6 \to x^2-4x+4+2 \to y=(x-2)^2+2 \to y-2=(x-2)^2$

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

$(5\times 4)+1 \quad \frac{-21}{4} \qquad \underbrace{y-2\geq 0}_{} \to y\geq 2 \to R_f=[2,+\infty)$

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

R_f

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

$x^2=\frac{3+2y}{1-y} \to x=\pm\sqrt{\frac{3+2y}{1-y}} \to 1-y>0 \to y<1 \quad 2y\geq -3 \quad y\geq\frac{-3}{2}$

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

$y=\frac{2|x|+1}{|x|-4} \to 2|x|+1=y|x|-4y \quad |x|(2-y)=-1-4y$

$2|x|-y|x|=-1-4y \to |x|=\frac{1+4y}{2-y} \to -\frac{1}{4} \to 2$

$R_f=\left(-\infty,-\frac{1}{4}\right]\cup[2,+\infty)$

$y=\frac{1}{x^2-4x} \quad 1=yx^2-4yx \to yx^2-4yx-1=0$ دلتا می‌گیریم

$16yx-4(y)(-1) \to 16yx+4y \to 16yx+4y\geq 0 \to$ در فرمول قرار می‌دهیم

$x=\frac{4y\pm\sqrt{16y^2+4y}}{2y} \to 16y^2+4y\geq 0 \to 4y(4y+1)\geq 0$

$4y+1\geq 0 \to 4y\geq -1 \to y\geq -\frac{1}{4}$

$-\frac{1}{4}$		0
$+$	$-$	$+$

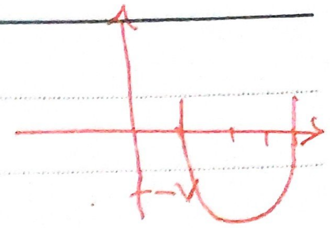
$R_f=\left(-\infty,-\frac{1}{4}\right]\cup[0,+\infty)$

Subject

Date : Year: Month: Day:

چون min است $\rightarrow [-7, +\infty)$

عسلی شیرعلی



min

$y = x^2 - 6x + 2$ $\qquad \frac{-b}{2a} = \frac{6}{2} = 3$ و -7 $\qquad \begin{bmatrix} 3 \\ -7 \end{bmatrix}$

$(3)^2 - 6(3) + 2$

$9 - 18 + 2 \rightarrow -7$

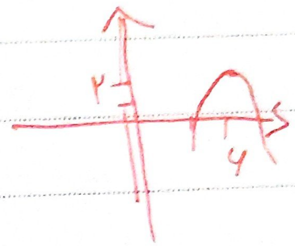
max

$y = -x^2 + 4x + 2$ $\qquad \frac{-b}{2a} \quad \frac{-4}{-2} = 2$ $\begin{bmatrix} 2 \\ 6 \end{bmatrix}$

منفی ← max $\rightarrow (-\infty, 6]$

$-(2)^2 + 8 + 2$

$-4 + 8 + 2 = 6$



Min

$y = \sqrt{x^2 - 6x + 2}$ $\qquad \frac{+6}{2} = \begin{bmatrix} +3 \\ -7 \end{bmatrix} \rightarrow \quad Rf \rightarrow [0, +\infty)$

$\cancel{9 - 18 + 2}$

Max

$y = \sqrt{-x^2 + 4x + 10} \rightarrow \frac{-4}{-2} = \begin{bmatrix} 2 \\ 14 \end{bmatrix} Rf = \sqrt{(-\infty, 14]} \rightarrow [0, \sqrt{14}]$

$-4 + 8 + 10$

$y = x^7 + 3x^4 + 2x + 1 \rightarrow Rf = \mathbb{R}$

تمام اعداد $\mathbb{R}$ مثبت چون اعداد منفی نمی‌توانند زیر رادیکال باشند

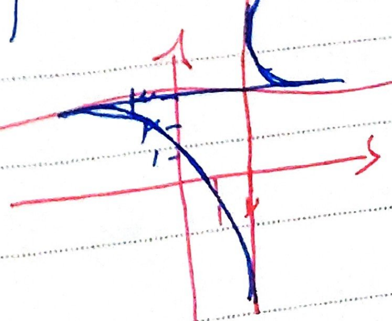
$y = \sqrt{x^5 + 4x^2 + 6x + 1} \rightarrow Rf = [0, +\infty)$

تابع هموگرافیک

$y = \frac{3x+1}{x-2}$ $\qquad Rf = \mathbb{R} - \left\{\frac{a}{c}\right\} \rightarrow Rf = \mathbb{R} - 3$

$\frac{a}{c} = \sqrt{4} = 2$ تمام اعداد $\mathbb{R}$ مثبت

$y = \sqrt{\frac{4x+1}{x+3}} \rightarrow \quad Rf = [0, +\infty) - \{2\}$



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

مجانب افقی $\frac{a}{c}$ $\quad 3$

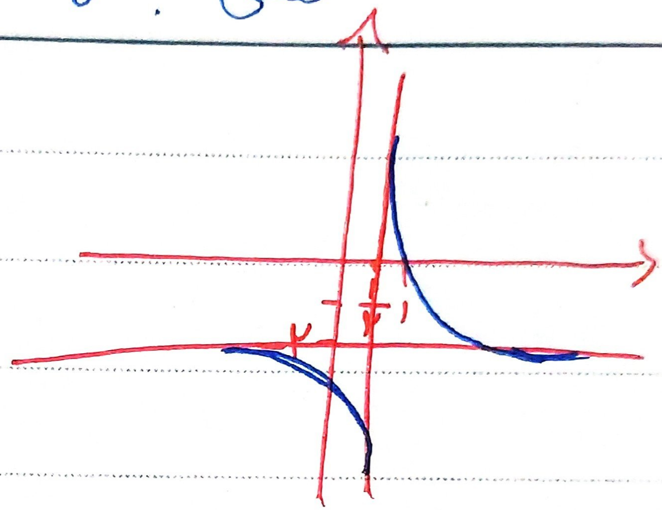
Subject

Date : Year: Month: Day:

کسری سبزعلی

$$y = \frac{4x-2}{1-2x} \qquad x \neq \frac{1}{2}$$

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



الف) $y = \cos^2 x + \frac{1}{\cos^2 x} \longrightarrow a^2 + \frac{1}{a^2} \longrightarrow R_f = [2, +\infty)$

ب) $y = \sqrt[3]{\frac{x^2+1}{x}} \longrightarrow \sqrt[3]{x + \frac{1}{x}} \longrightarrow R_f = (-\infty, -\sqrt[3]{2}] \cup [\sqrt[3]{2}, +\infty)$