

$$\begin{aligned} F(-x) - xF(x) &= 2|x| + 1 \\ F(x) + xF(-x) &= 2|x| + 1 \\ -xF(-x) + x^2F(x) &= 2x|x| + x \end{aligned} \Rightarrow \begin{aligned} (1+x^2)f(x) &= 2|x| + 1 - 2x|x| - x \\ f(x) &= \frac{(2|x| + 1)(1-x)}{1+x^2} \end{aligned}$$

$$\begin{aligned} F(0) + f(0) &= 0^2 - 3(0) + 4 = 4 \\ F(0) &= 3 \\ f(x) &= x^2 - 3x + 4 - \underbrace{f(0)} = x^2 - 3x + 3 \\ f(x^2) &= x^4 - 3x^2 + 3 \end{aligned}$$

$$\begin{aligned} x^2 + x + 2 &= yx - y \\ x^2 - (y-1)x + (2+y) &= 0 \end{aligned} \Rightarrow y \in \mathbb{R} - (-1, 7)$$

$$x = \frac{y-1 \pm \sqrt{y^2 - 2y + 1 - 4(2+y)}}{2} = \frac{y-1 \pm \sqrt{y^2 - 4y - 7}}{2}$$

(ج) برد تابع زیر را بیابید
بر برد تابع $\sqrt{x} \in (0, +\infty)$

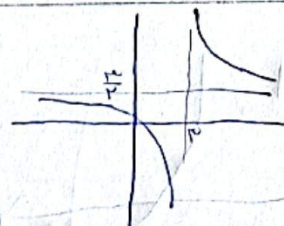
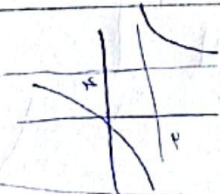
اندا $\leftarrow$ مشتق $\leftarrow 0$
 $x = \frac{5}{4}$ $2x(\frac{5}{4})^2 - 5x\frac{5}{4} + 1 = -\frac{11}{8}$
 $xy \geq -\frac{11}{8}$

(د) برد تابع زیر را بیابید
 $y = -\infty$ هتای کور دیک به ۰ است
 $y = +\infty$ هتای که x بی نهایت است
 $R_f = \mathbb{R}$ ✓

$$\begin{aligned} \frac{1+5}{2} &= 3 \\ \sqrt{-9+11-5} &= 1 \\ y &\in [0, 2] \checkmark \end{aligned}$$

(ب)
 $\sqrt{(x-5)(x-1)}$
 $\frac{-1+5}{-1+1} = 1$
 $1 \leq x \leq 5$

$R_f = [0, +\infty) \cup \{0\}$



(الف)
 $R_f = \mathbb{R} - \{0\}$

$$\begin{aligned} x^2 + 4 + \frac{1}{x^2 + 4} &= x \\ x=0 & \quad 4 + \frac{1}{4} = \frac{17}{4} \\ y &\geq \frac{17}{4} \end{aligned}$$

(ج)
 $x=0 \quad y = \frac{4}{\sqrt{2}}$
 $y \geq \frac{4}{\sqrt{2}}$

$$\frac{f(0)+4}{0-1} = -4$$

$$\frac{f(\infty)+4}{\infty-1} = 3$$

$$R_f = \mathbb{R} - (-4, 3]$$

منخرج می‌تواند منفی شود

$$(3-y)x^2 + (y+4) = 0$$

$$\Delta = \sqrt{0-4(-y^2-y+12)} = \sqrt{4y^2+4y-48}$$

$$y^2+y-12 \geq 0$$

$$(y+4)(y-3) \geq 0$$

$$y \leq -4 \text{ یا } y \geq 3 \quad y \in \mathbb{R} - (-4, 3] \checkmark$$

اصلی

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$$\frac{f(1)+4}{1-3} = -3$$

$$\frac{f(-1)+4}{-1-3} = -\frac{2}{5}$$

$$D_f = \left[-\frac{2}{5}, -3\right]$$

منخرج ۵ نمی‌شود

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$$\sqrt{\frac{9(x-2)}{4(x-2)}} = \frac{3}{2} \quad R_f = \left\{\frac{3}{2}\right\}$$

(-)

$$y = \frac{3x-1}{4x} \leftarrow f(x)$$

$$-\frac{1}{4x-2}$$

$$f'(x)$$

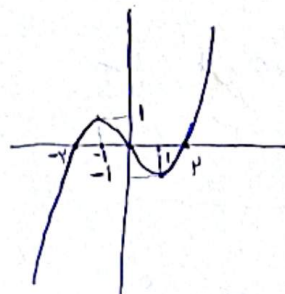
$$|R_f| = [0, +\infty) \cup \left\{\frac{3}{2}\right\}$$

$$D_{f'}(x) = \mathbb{R} - \left\{\frac{1}{2}\right\} \rightarrow R_f = \mathbb{R} - \left\{\frac{3}{2}\right\}$$

(الف)

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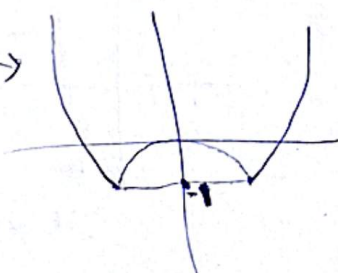
$$y = \begin{cases} x > 0 & x^2 - 2x \\ x < 0 & -x^2 - 2x \end{cases}$$



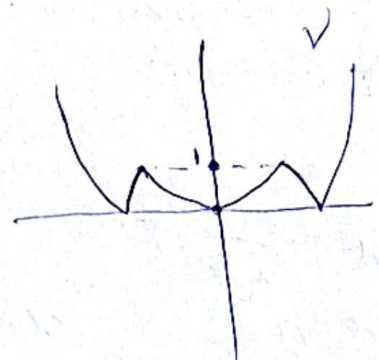
$$R_f = \mathbb{R}$$

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$$f(|x|)+1 \rightarrow$$



$$|f(|x|)+1| \rightarrow$$



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