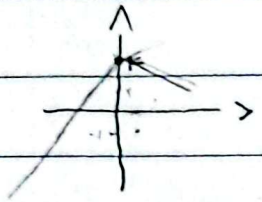
حسن توکلی

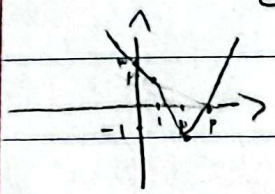
۱) الف = $y = x + |2x - 4|$

$$y = \begin{cases} x + 2x - 4 \to x > 0 \Rightarrow 3x - 4 \\ 4 \to x = 0 \\ x - 2x + 4 \to x < 0 \Rightarrow -x + 4 \end{cases} \Rightarrow R_f = R$$



ب = $y = |x - 2| + |x - 1| - |x|$

$$y = \begin{cases} x - 2 + x - 1 - x & x > 2 \Rightarrow x - 3 \\ -x + 2 + x - 1 - x & 1 \le x \le 2 \Rightarrow -x + 1 \\ -x + 2 - x + 1 + x & x < 1 \Rightarrow -x + 3 \end{cases} \quad R_f = R$$



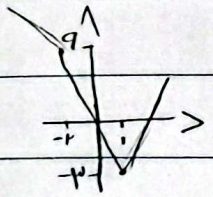
$(0, 3), (1, 2), (2, -1), (3, 0)$

۲) $x < -2 \to$ عبارت منفی

$|3x - 3| = -(3x - 3) = -3x + 3$ ، $|x + 2| = -(x + 2) = -x$

$k = -3$ مقادیر اطراف دارد

$f(x) = -3x + 3 - (-x - 2) = -2x + 5$



$-2 \le x < 1 \Rightarrow -3x + 3 - (x + 2) = -4x + 1$

$x \ge 1 \Rightarrow$ عبارت مثبت

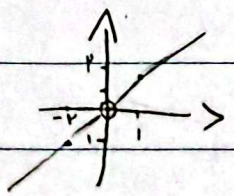
$3x - 3 - (x + 2) = 2x - 5$

۳) الف = $x + \frac{x}{|x|}$ $\Big\}$ $|x| = x \Rightarrow \frac{x}{|x|} = \frac{x}{x} = 1 \quad x > 0$

$y = x + 1$

$|x| = -x \Rightarrow \frac{x}{|x|} = \frac{x}{-x} = -1 \quad x < 0$

$y = x - 1$



if $x = 0$ تعریف نشده

صبح زود

۵) الف = $3x - [4x]$ $Rf = [0, 1)$

ب = $4x - 4[x] = 4(x - [x]) \Rightarrow [0, 4)$

ج = $x - 5\left[\frac{x}{5}\right] = Rf = R$

د = $[2x] - 2x = Rf = (-1, 0]$

۶) الف = $\frac{3\sin x + 2\cos x}{\sqrt{9+4}} = \left[-\sqrt{13}, \sqrt{13}\right]$

ب ×

ج = $\left[\left[-\sqrt{7}, \sqrt{7}\right]\right]$ $-3, -2, -1, 0, 1, 2$

د ×

۷) الف = $\sin x = \frac{-b}{2a} = \frac{-3}{2}$ $f\left(-\frac{3}{2}\right) = \frac{-9}{4}$

$\sin x = 1 \Rightarrow 4$ max

$1 - 3 + 2 \leftarrow \sin x = -1 \Rightarrow 0$ $\left[-\frac{9}{4}, 4\right]$

ب = $\sin x = \frac{-b}{2a} = \frac{-3}{4}$ $f\left(-\frac{3}{4}\right)$

$\sin x = 1 \Rightarrow 4 \Rightarrow$ max $\left[\frac{7}{8}, 4\right]$

$\sin x = -1 \Rightarrow 0$

۸) الف = $y = \sin^2 x + 4\cos^2 x$

$1 + 3\cos^2 x \Rightarrow [1, 4]$

$[0, \pi]$

ب = $y = \frac{2\cot x}{1 + \cot^2 x} = \frac{2\frac{\cos x}{\sin x}}{\frac{1}{\sin^2 x}} = \frac{2\cos x \sin^2 x}{\sin x} = 2\cos x \sin x$

$\frac{1}{\sin^2 x}$ $\frac{1}{\frac{\sin^2 x}{\sin x}}$

SEVIL

حل سوالی

۹) الف = $\frac{1}{4} \le \sin^4 x + \cos^4 x \le 1$ $\quad [\frac{1}{2}, 1]$

ب = $\frac{1}{8} \le \sin^8 x + \cos^8 x \le 1$ $\quad [\sin^8 x + \cos^8 x] = \{0, 1\} \Rightarrow$

$R_f = \{0, 1\}$

۱۰) الف = ج

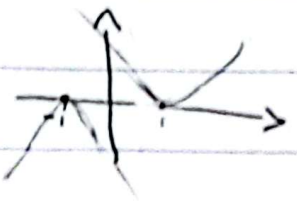
ب = ج

۳) ب = $y = x|x| - \frac{x}{|x|}$

$y = x^2 - 1 \Leftarrow \frac{x}{|x|} = 1 \; , \; |x| = x \Leftarrow x > 0$ if

$y = -x^2 + 1 \Leftarrow \frac{x}{|x|} = -1 \; , \; |x| = -x \Leftarrow x < 0$ if

$x = 0 \Leftarrow$ ن



۴) الف = if $[x] = -2$ $\quad -2 \le x < -1$ $\quad y = -x^2 - 2$

if $[x] = -1$ $\quad -1 \le x < 0$ $\quad y = -1 - x^2$

if $[x] = 0$ $\quad 0 \le x < 1$ $\quad y = -x^2$

if $[x] = 1$ $\quad 1 \le x < 2$ $\quad y = 1 - x^2$

ب = if $[x] = -2$ $\quad -2 \le x < -1$ $\quad y = -2|x| = \frac{-2(-x)}{2x} =$

if $[x] = -1$ $\quad -1 \le x < 0$ $\quad y = -1|x| = -1(-x) =$

if $[x] = 0$ $\quad 0 \le x < 1$ $\quad y = 0$

if $[x] = 1$ $\quad 1 \le x < 2$ $\quad y = |x| = x$