توابع و خواص آنها

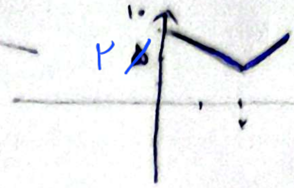
نام و نام خانوادگی: سانیا حاوری

مقطع: یازدهم ۸۰ — ساختن B سایتس شبه

۱۸٫۲۵

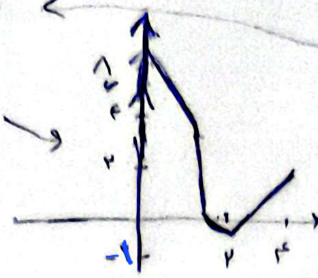
۱)

الف) $y = x + |2x-4|$



$R=[2,+\infty)$ ، (۱)

ب) $y = |x-2| + |x-1| - x$



$R=(-1,+\infty)$

نوشتن ضابطه ببرد

۲)

$|3x-3| - |x+2| = K$

$x=2 \rightarrow K=9$

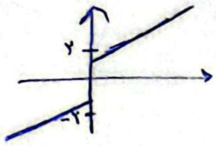
$x=1 \rightarrow 3(1)-3 - |3| = K \rightarrow K=-3 \rightarrow$ کمترین مقدار $\rightarrow$

- $K>-3 \rightarrow y=K \rightarrow$ ۲ جواب دارد و خط را دو نقطه قطع می‌کند
- $K=-3 \rightarrow$ یک جواب $\rightarrow x=1 \rightarrow K=-3$
- $K<-3 \rightarrow$ هیچ جوابی ندارد

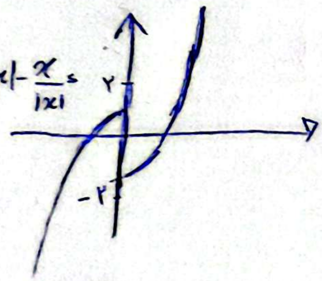
۲

۳)

الف) $x + \frac{x}{|x|}$



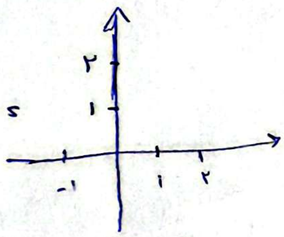
ب) $x|x| - \frac{x}{|x|}$

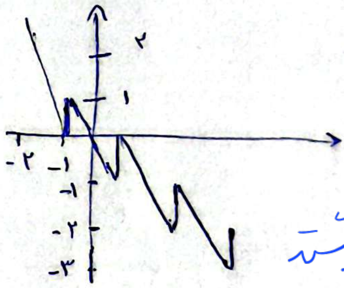


۲

۴)

الف) $y = [x] - 2x$



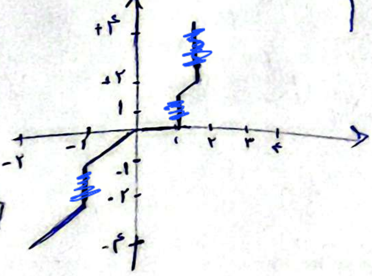


در بازه $[-2,2]$

۱٫۷۵

ضابطه‌ها نوشته شود

ب) $y=[x][x]$



۵)

① $y = 3x - [3x] \rightarrow 0 \le y < 1 \rightarrow R_f=[0,1)$

② $y = 4x - 4[x] \rightarrow 0 \le y < 4 \rightarrow R_f=[0,4)$

③ $y = x - 5[\frac{x}{5}] \rightarrow 0 \le y < 5 \rightarrow R_f=[0,5)$

④ $[2x] - 2x = -1 < y \le 0 \rightarrow R_f=(-1,0]$

۲

$y = 3\sin x + 2\cos x$

$a = 3 \quad b = 2$

$[-\sqrt{3^2+2^2}, \sqrt{3^2+2^2}] = R_f = [-\sqrt{13}, \sqrt{13}]$

(6)

$y = a\sin(x) + b\cos(x)$

$\hookrightarrow R_f = [-\sqrt{a^2+b^2}, \sqrt{a^2+b^2}]$

$y = 4\sin x - 3\cos x \longrightarrow [-\sqrt{16+9}, \sqrt{16+9}]$

$R_f = -5 \leq y \leq 5 \longrightarrow [-5, 5]$

(5)

$y = [2\sin x + 5\cos x]$

$R = \sqrt{2^2+5^2} = \sqrt{29} \longrightarrow -\sqrt{29} \leq 2\sin x + 5\cos x \leq \sqrt{29}$

$[-5.4, 5.4]$

اعدادی که در بازه هستند $= \{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$

$y = \sqrt{\cos x - 2\sin x} \longrightarrow \cos x - 2\sin x \geq 0$

$R = \sqrt{1^2+(-2)^2} = \sqrt{5} \longrightarrow -\sqrt{5} \leq \cos x - 2\sin x \leq \sqrt{5}$

$0 \leq y \leq \sqrt{5} \longrightarrow R_f = [0, \sqrt{5}]$

(7)

الف) $y = \sin^2 x + 3\sin x + 2 \Rightarrow y = t^2 + 3t + 2 = (t+1)(t+2) \rightarrow t = -\frac{3}{2}$

$y(-1) = (-1)^2 + 3(-1) + 2 = 0 \quad y(1) = 1 + 3 + 2 = 6 \longrightarrow [0, 6]$

ب) $y = 2\sin^2 x + 3\sin x + 2$

$y = 2t^2 + 3t + 2 \longrightarrow t = -\frac{3}{4}$

$y(-\frac{3}{4}) = 2(\frac{9}{16}) + 3(-\frac{3}{4}) + 2 = \frac{18}{16} - \frac{9}{4} + 2 = \frac{9}{8} - \frac{18}{8} + \frac{16}{8} = \frac{7}{8}$

$y(-1) = 2(1) + 3(-1) + 2 = 1 \qquad y(1) = 2(1) + 3(1) + 2 = 7 \longrightarrow R_f = [\frac{7}{8}, 7]$

(8)

$y = \sin^2 x + 4\cos^2 x$

$\sin^2 x + \cos^2 x = 1 \longrightarrow \cos^2 x = 1 - \sin^2 x \longrightarrow y = \sin^2 x + 4 - 4\sin^2 x$

$4 - 3\sin^2 x$

(5)

$0 \leq \sin^2 x \leq 1 \longrightarrow 4 + 0 \geq 4 - 3\sin^2 x \geq 4 - 3 \rightarrow 4 \geq y \geq 1 \longrightarrow [1, 4]$

$y = \frac{2\cot x}{1+\cot^2 x} \longrightarrow 1 + \cot^2 x = \csc^2 x \longrightarrow \csc x = \frac{1}{\sin x} \quad \cot x = \frac{\cos x}{\sin x}$

$y = \frac{\frac{2\cos x}{\sin x}}{\frac{1}{\sin^2 x}} \Rightarrow y = \frac{2\cos x}{\sin x} \times \sin^2 x = 2\cos x \sin x$

$2\sin x \cos x = \sin(2x) \longrightarrow [-1, 1]$

(9)

الف) $y = \sin^4 x + \cos^4 x = (\sin^2 x)^2 + (\cos^2 x)^2 \qquad a = 0 \rightarrow y = 1$

$a = \sin^2 x \longrightarrow 0 \leq a \leq 1 \longrightarrow \cos^2 x = 1 - \sin^2 x \quad (a = \sin^2 x) = 1 \Rightarrow y = 1$

(1.75)

$y = 3a^2 - 3a + 1 \quad 0 \leq a \leq 1 \longrightarrow a = \frac{-(-3)}{6} = \frac{3}{6} = \frac{1}{2}$

$R_f = [1, \frac{1}{4}]$ (crossed out) $[\frac{1}{2}, 1]$

$y = 3(\frac{1}{2})^2 - 3(\frac{1}{2}) + 1 = \frac{3}{4} - \frac{3}{2} + 1 = \frac{1}{4}$

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ب) $[\sin x + \cos x]$ ۹

min $= \frac{1}{8}$
max $= 1$ $\to [\frac{1}{8}, 1] \to R_f = [0, 1]$ $\{0, 1\}$

الف) $y = \frac{2x^2 + 7x - 4}{x + 4} \to x \neq -4 \to \div\ x + 4$

$= 2x - 1 \to x \neq -4 \to y = 2(-4) - 1 = -9$ ۱,۷۵

$R_f = \{-9\}$ $\quad x = -4$

ج) $y = \frac{x^3 - 1}{x - 1} \Rightarrow \frac{(x-1)(x^2 + x + 1)}{x - 1}$

$y = x^2 + x + 1 \quad x \neq 1$

$x = -\frac{b}{2a} = -\frac{1}{2} \to y(-\frac{1}{2}) = (-\frac{1}{2})^2 + (-\frac{1}{2}) + 1 = \frac{1}{4} - \frac{1}{2} + 1 = \frac{3}{4}$

$R_f = [\frac{3}{4}, +\infty)$

$x = 1 \quad y = 1^2 + 1 + 1 = 3$

$[\frac{3}{4}, +\infty) - \{3\}$