

الف) $y^3 - x = 2x^2$

$\hookrightarrow \text{if } (x_1, y_1) \in f$
 $\text{if } (x_2, y_2) \in f \} \xrightarrow{x=x_2} y_1 = y_2$

تابع است

$y_1^3 - x_1 = 2x_1^2$
 $y_2^3 - x_2 = 2x_2^2 \} \xrightarrow{x_1=x_2} y_1^3 = y_2^3 \rightarrow y_1 = y_2$

ب) $|y| + x^2 = x + 3$

$|y_1| + x_1^2 = x_1 + 3$
 $|y_2| + x_2^2 = x_2 + 3 \} \xrightarrow{x_1=x_2} |y_1| = |y_2|$

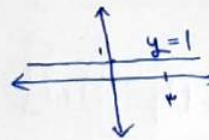
$\hookrightarrow y_1 = \pm y_2$ تابع نیست

ج) $\sqrt{x^2 + |y-2|} = 0$

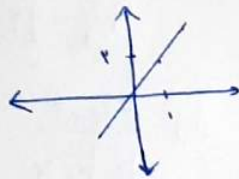
$\sqrt{x^2} + \sqrt{|y-2|} = 0$
 $\rightarrow |x| = 0$ تابع است

د) $x = \cos y$

$x=0 \rightarrow \cos y = 0 \rightarrow y = \frac{\pi}{2}, \frac{3\pi}{2}, \dots$
تابع نیست



الف) تابع ثابت $y = k$



ب) تابع خطی $y = ax + b$

الف) $y = ax + b$ تابع خطی $y = x$
 $a + 2b = 1 + 2(0) = 1$

$a + 2b = -\varepsilon + 2(\omega) = -\varepsilon + 0 = -\varepsilon$

$1 = -\varepsilon + b$

$1 = -\varepsilon + b \rightarrow b = \omega$

$x = 2 \rightarrow y = 1$

$1 = 2^2 + (-\varepsilon)(2) + b$

$\frac{-b}{2a} = -\frac{\alpha}{2} = 2$

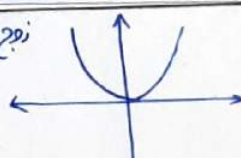
$\hookrightarrow -a = \varepsilon \rightarrow \alpha = -f$

$y = x^2 + ax + b$

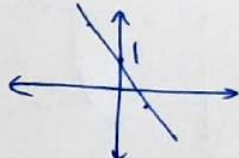
الف) $y = 2x + 1$



ج) $y = x^2$



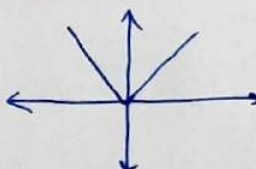
ب) $y = -3x + 1$



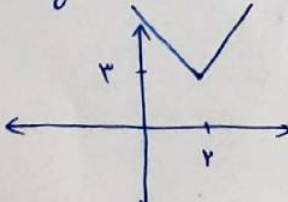
د) $y = x^3$



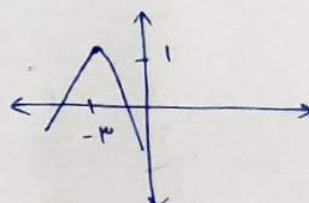
$y = |x|$



الف) $y = |x-2| + 3$



ب) $y = -|x+3| + 1$



الف) $y = \frac{x+4}{x^2-4x}$

خرج $\neq 0$

$\rightarrow x^2-4x \neq 0 \rightarrow x(x-4) = 0$
 $x=0 \quad x=4$
 $D_f = \mathbb{R} - \{0, 4\}$

ب) $y = \frac{x+4}{x^2-7x+14}$

$\rightarrow x^2-7x+14=0$

$\Delta = b^2-4ac = (-7)^2-4(1)(14) = 49-56 = -7$
 $D_f = \mathbb{R}$
 ریشه ندارد $\rightarrow$ خروج برای هیچ مقداری صفر نمی شود

ج) $y = \frac{x+4}{x^2+x+4}$

$\Delta = 1-16 = -15$

$D_f = \mathbb{R}$

د) $y = \frac{x+4}{x^2-4x}$ $x^2(x^2-4) = 0 \rightarrow x^2(x-2)(x+2)$

$\rightarrow x=0 \quad x=2 \quad x=-2$
 $D_f = \mathbb{R} - \{-2, 2, 0\}$

الف) $y = \sqrt{4-x} + \sqrt{2x+2}$

$4-x \geq 0$
 $x \leq 4$

$2x+2 \geq 0$
 $x \geq -1$

$\rightarrow -1 \leq x \leq 4 \rightarrow D_f = [-1, 4]$

ب) $y = \frac{\sqrt{x-2}}{x-4}$

$x-2 \geq 0$
 $x \geq 2$

$x-4 \neq 0 \rightarrow x \neq 4$

$D_f = [2, +\infty) - \{4\}$

ج) $y = \frac{2x+1}{x^2+1}$

$x^2+1=0$

$\rightarrow x^2 = -1$

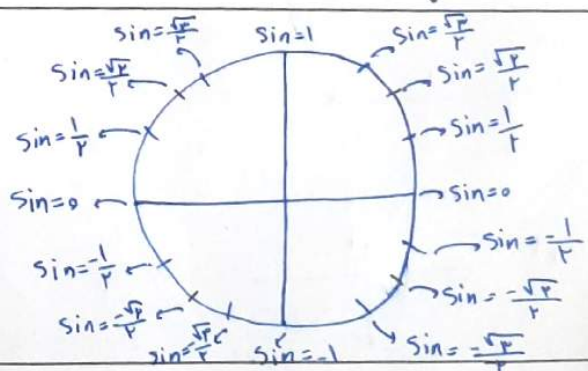
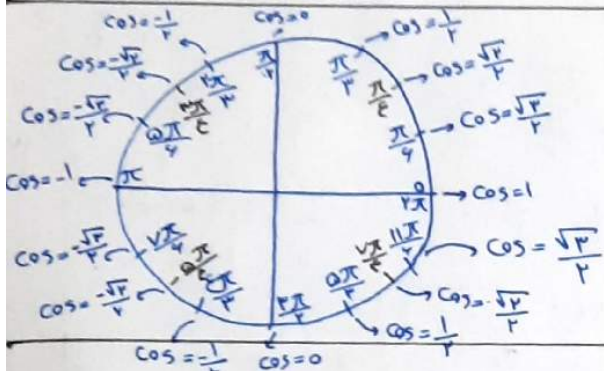
$D_f = \mathbb{R}$

هیچوقت صفر نمی شود

د) $y = \frac{2x+3}{|x|+x^2}$

$\rightarrow \checkmark$
 $\rightarrow \alpha$
 $\rightarrow +\checkmark$

$D_f = (-\infty, 0) \cup (0, +\infty)$



$\cos \frac{2\pi}{3} = -\frac{1}{2} \xrightarrow{\text{قرینه}} -(-\frac{1}{2}) = \frac{1}{2}$

الف) قرینه سینوس $\frac{2\pi}{3}$ ، سینوس تمام زاویه ها را در بیان

$\sin \theta = \frac{1}{2} \rightarrow \theta = \frac{\pi}{6}, \frac{5\pi}{6} \rightarrow \frac{\pi}{6} + 2K\pi, \frac{5\pi}{6} + 2K\pi$

$\cos \frac{11\pi}{6} = \frac{\sqrt{3}}{2} \xrightarrow{\text{قرینه}} -(\frac{\sqrt{3}}{2}) = -\frac{\sqrt{3}}{2}$

ب) قرینه سینوس $\frac{11\pi}{6}$ ، سینوس تمام زاویه ها را در بیان

$\sin \theta = -\frac{\sqrt{3}}{2} \rightarrow \theta = \frac{4\pi}{3}, \frac{5\pi}{3} \rightarrow \frac{4\pi}{3} + 2K\pi, \frac{5\pi}{3} + 2K\pi$