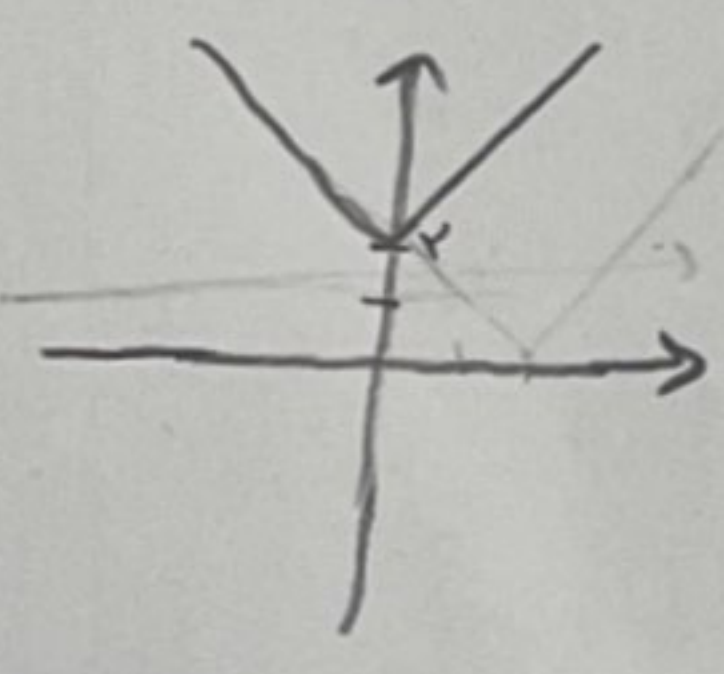
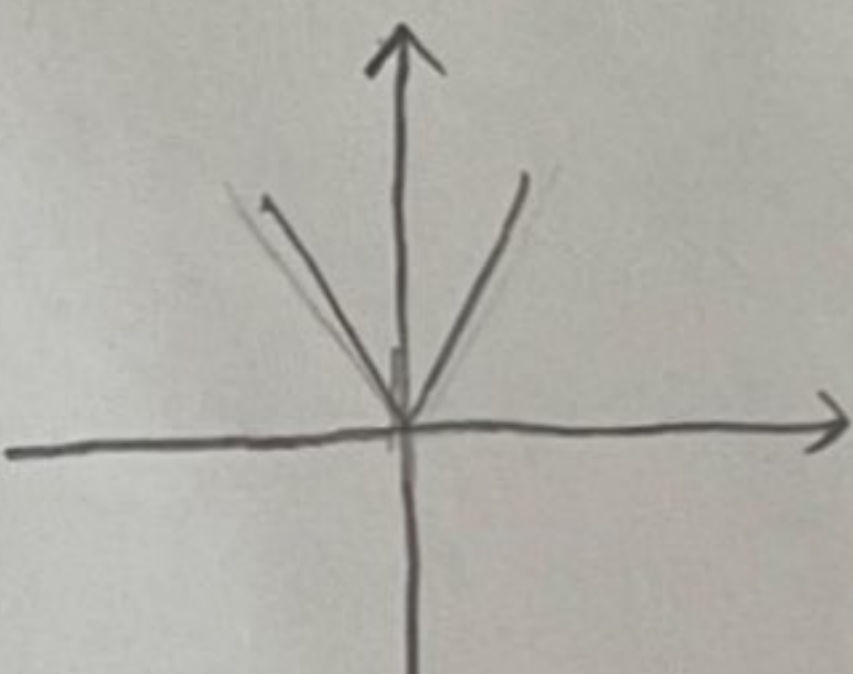
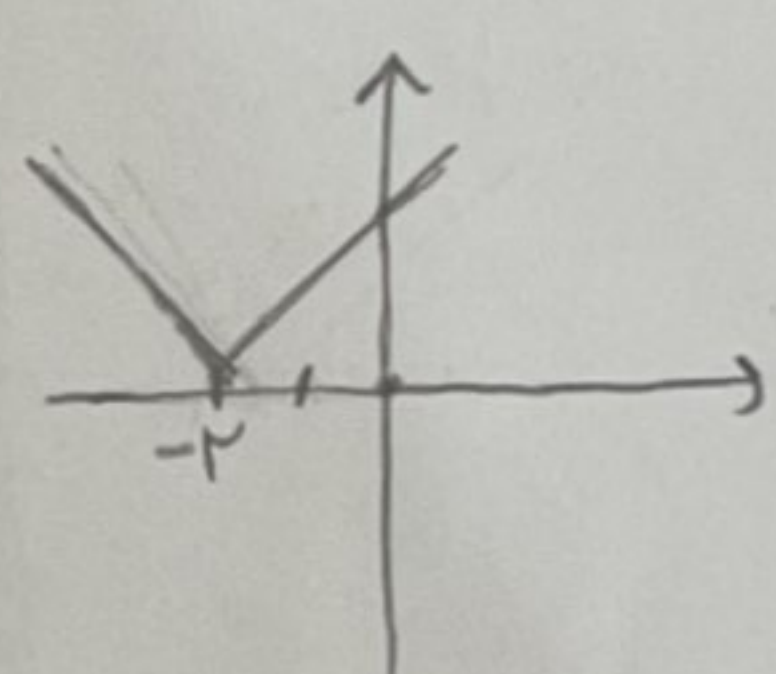
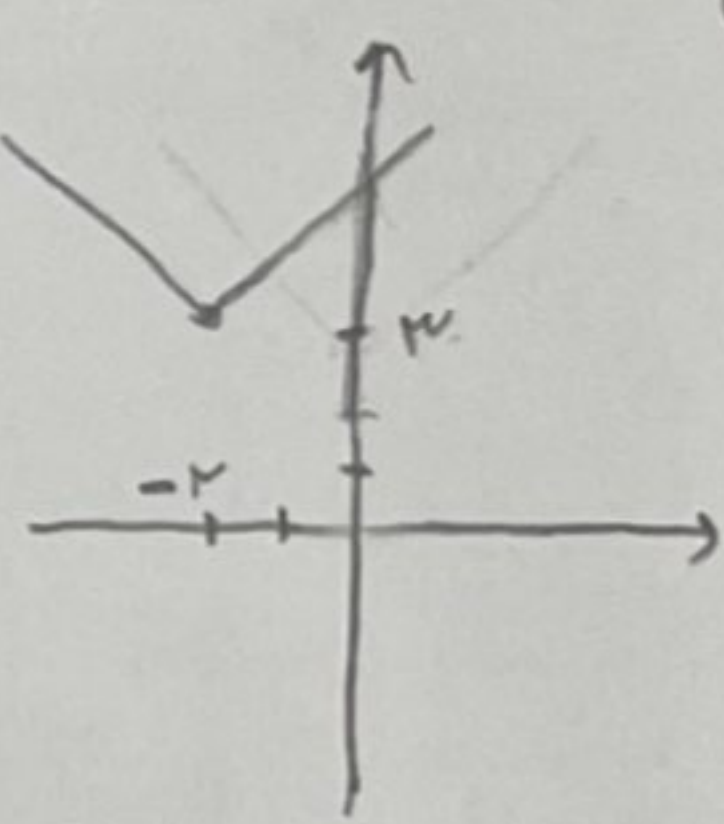
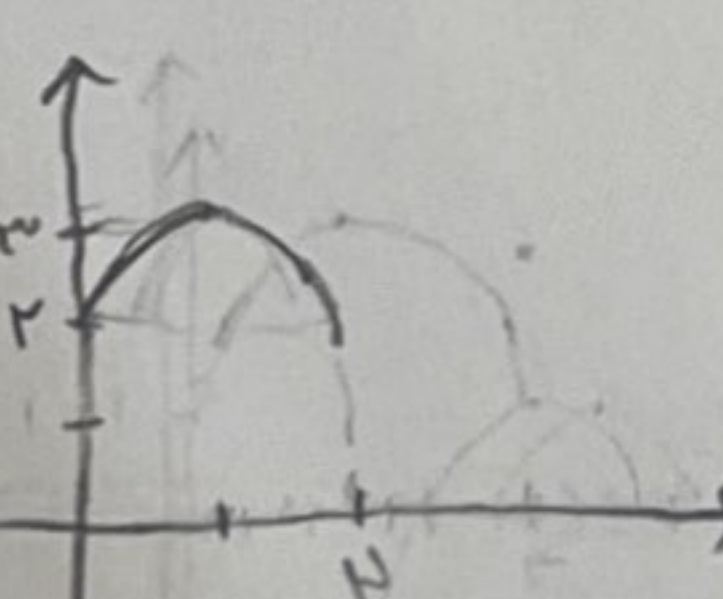
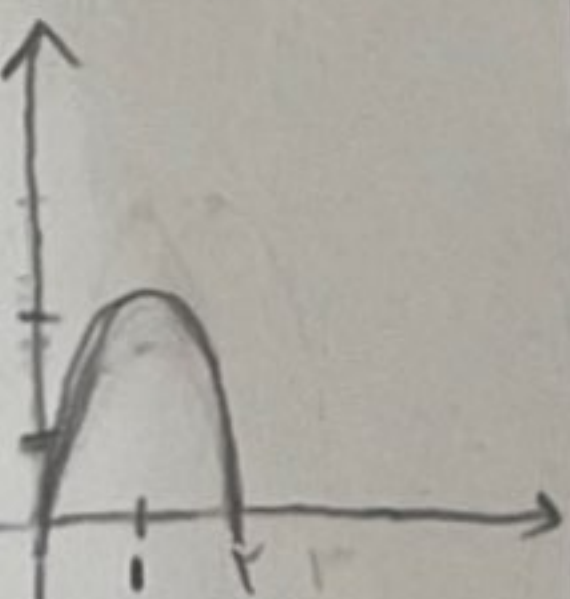
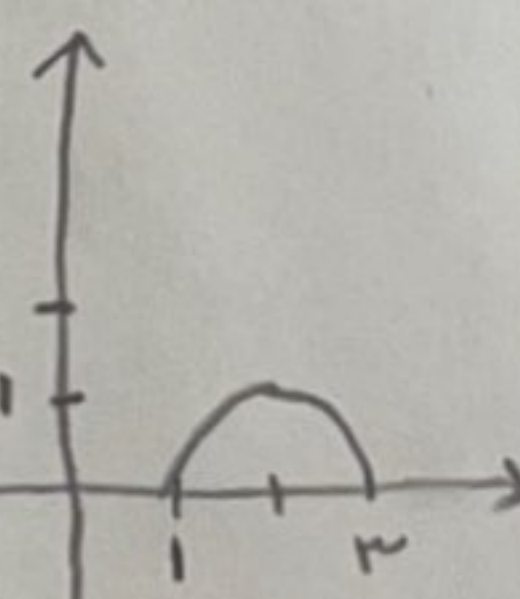
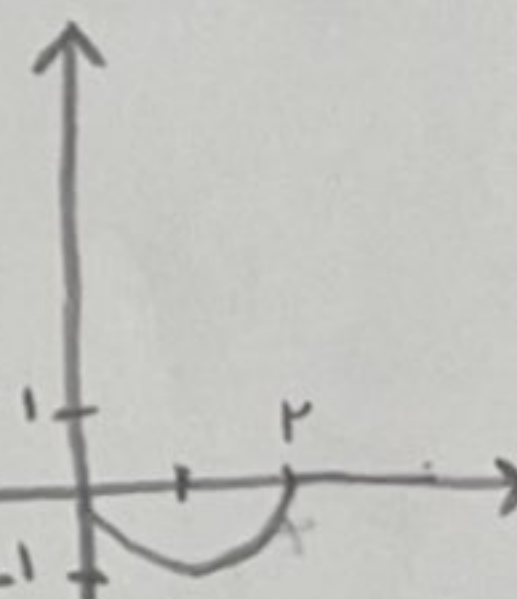


(الف) $y^3 - x = 2x^2$ $y^3 = 2x^2 + x$ $y = \sqrt[3]{2x^2 + x}$ تابع هست. راشه: $\mathbb{R}$ ✓	(ب) $y + x^2 = x + 3$ $x = 1$ $y = 3$ $y = \pm 3$ تابع نیست. ✓	(ج) $\sqrt{x-4} + y-2 = 0$ $\downarrow \quad \downarrow$ $\geq 0 \quad \geq 0$ $\downarrow \quad \downarrow$ $0 \quad 0$ $(x, y) = (4, 2)$ تابع نیست. ✓	(د) $x = \cos y$ $x = 1$ $y = 2k\pi$ تابع نیست. ✓	۱
(الف) $y = \frac{x+4}{x^2-4x}$ $x^2 - 4x = 0$ $x(x-4) = 0$ $\begin{cases} x=0 \\ x=4 \end{cases}$ $D_f = \mathbb{R} - \{0, 4\}$ ✓	(ب) $y = \frac{x+4}{x^2-7x+16}$ $x^2 - 7x + 16 = 0$ $\Delta = b^2 - 4ac$ $\Delta = (-7)^2 - 4(1)(16) = -15$ رایشه حقیقی ندارد $D_f = \mathbb{R}$ ✓	(ج) $y = \frac{x+4}{x^2+x+4}$ $x^2 + x + 4 = 0$ $\Delta = b^2 - 4ac$ $\Delta = 1^2 - 4(1)(4) = -15$ رایشه حقیقی ندارد $D_f = \mathbb{R}$ ✓	(د) $y = \frac{x+4}{x^4-4x^2}$ $x^4 - 4x^2 = 0$ $x^2(x^2-4) = 0$ $x^2 = 0 \rightarrow x = 0$ $x^2 - 4 \rightarrow x = 2$ $x = -2$ $(-\infty, -2) \cup (-2, 0) \cup (0, 2) \cup (2, \infty)$ $\mathbb{R} - \{0, \pm 2\}$	۲
(الف) $y = \sqrt{4-x} + \sqrt{x-2}$ $4-x \geq 0 \quad x-2 \geq 0$ $2 \leq x \leq 4$ $2 \leq x \leq 4$ $D_f = [2, 4]$	(ب) $y = \frac{x+1}{x^2+1}$ $x^2 + 1 = 0$ $x^2 = -1 \rightarrow$ ریشه حقیقی ندارد $D_f = \mathbb{R}$ ✓	(ج) $y = \frac{\sqrt{x-2}}{x-4}$ $x-2 \geq 0 \rightarrow x \geq 2$ $x-4 \neq 0 \rightarrow x \neq 4$ $D_f = [2, 4) \cup (4, +\infty)$ ✓	(د) $y = \frac{2x+3}{ x +x^2}$ $x + x^2 \neq 0$ $x > 0$ $x + x^2 = x(x+1) \neq 0 \rightarrow x \neq 0, -1$ $x < 0$ $-x + x^2 = x^2 - x = x(x-1) \neq 0 \rightarrow x \neq 0, 1$ $D_f = (-\infty, -1) \cup (-1, 0) \cup (0, 1) \cup (1, +\infty)$ $\mathbb{R} - \{0, \pm 1\}$	۳
(الف) 	(ب) 	(ج) 	(د) 	۴
(الف) 	(ب) 	(ج) 	(د) 	۵

$y = (x-2)(x-3)(x-4)$ $\begin{cases} x=2 \\ x=3 \\ x=4 \end{cases}$ <table><tr><td>x</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td>-</td><td>+</td><td>-</td></tr><tr><td></td><td>+</td><td>-</td><td>+</td></tr></table>	x	2	3	4		-	+	-		+	-	+	(الف) $y = (x-2)(x-3)^2(x-4)$ $\begin{cases} x=2 \\ x=3 \\ x=4 \end{cases}$ <table><tr><td>x</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td>-</td><td>+</td><td>-</td></tr><tr><td></td><td>+</td><td>-</td><td>+</td></tr></table>	x	2	3	4		-	+	-		+	-	+	(ب) $y = (x-2)(x-3)^2(x-4)$ $\begin{cases} x=2 \\ x=3 \\ x=4 \end{cases}$ <table><tr><td>x</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td>-</td><td>+</td><td>-</td></tr><tr><td></td><td>+</td><td>-</td><td>+</td></tr></table>	x	2	3	4		-	+	-		+	-	+	6
x	2	3	4																																				
	-	+	-																																				
	+	-	+																																				
x	2	3	4																																				
	-	+	-																																				
	+	-	+																																				
x	2	3	4																																				
	-	+	-																																				
	+	-	+																																				
$y = \frac{(x-2)(x-4)}{x-3}$ $\begin{cases} x=2 \\ x=3 \\ x=4 \end{cases}$ <table><tr><td>x</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td>-</td><td>+</td><td>-</td></tr><tr><td></td><td>+</td><td>-</td><td>+</td></tr></table>	x	2	3	4		-	+	-		+	-	+	(الف) $y = \frac{(x-2)(x-4)}{(x-3)^2}$ $\begin{cases} x=2 \\ x=3 \\ x=4 \end{cases}$ <table><tr><td>x</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td>-</td><td>+</td><td>-</td></tr><tr><td></td><td>+</td><td>-</td><td>+</td></tr></table>	x	2	3	4		-	+	-		+	-	+	(ب) $y = \frac{(x-2)(x-4)}{(x-3)^2}$ $\begin{cases} x=2 \\ x=3 \\ x=4 \end{cases}$ <table><tr><td>x</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td>-</td><td>+</td><td>-</td></tr><tr><td></td><td>+</td><td>-</td><td>+</td></tr></table>	x	2	3	4		-	+	-		+	-	+	7
x	2	3	4																																				
	-	+	-																																				
	+	-	+																																				
x	2	3	4																																				
	-	+	-																																				
	+	-	+																																				
x	2	3	4																																				
	-	+	-																																				
	+	-	+																																				
$y = \frac{x^3 - 3x + 2}{x-3}$ $\begin{cases} x=-2 \\ x=1 \\ x=3 \end{cases}$ <table><tr><td>x</td><td>-2</td><td>1</td><td>3</td></tr><tr><td></td><td>+</td><td>-</td><td>-</td></tr><tr><td></td><td>-</td><td>+</td><td>+</td></tr></table>	x	-2	1	3		+	-	-		-	+	+	(الف) $y = \frac{x^2 - 3x + 2}{x^2 - 3x + 3} = \frac{(x-1)(x-2)}{(x-1)(x-3)}$ $\begin{cases} x=1 \\ x=2 \\ x=3 \end{cases}$ <table><tr><td>x</td><td>1</td><td>2</td><td>3</td></tr><tr><td></td><td>+</td><td>-</td><td>-</td></tr><tr><td></td><td>-</td><td>+</td><td>+</td></tr></table>	x	1	2	3		+	-	-		-	+	+	(ب) $y = \frac{x^2 - 3x + 2}{x^2 - 3x + 3} = \frac{(x-1)(x-2)}{(x-1)(x-3)}$ $\begin{cases} x=1 \\ x=2 \\ x=3 \end{cases}$ <table><tr><td>x</td><td>1</td><td>2</td><td>3</td></tr><tr><td></td><td>+</td><td>-</td><td>-</td></tr><tr><td></td><td>-</td><td>+</td><td>+</td></tr></table>	x	1	2	3		+	-	-		-	+	+	8
x	-2	1	3																																				
	+	-	-																																				
	-	+	+																																				
x	1	2	3																																				
	+	-	-																																				
	-	+	+																																				
x	1	2	3																																				
	+	-	-																																				
	-	+	+																																				
$y = \frac{x^4 - x^2}{x^2 + x + 2} = \frac{(x^2 + x)(x^2 - x)}{(x^2 + x + 2)}$ $\begin{cases} x=-1 \\ x=0 \\ x=1 \end{cases}$ $\Delta = b^2 - 4ac$ $\Delta = 1 - 4(1)(2) = -7$ <table><tr><td>x</td><td>-1</td><td>0</td><td>1</td></tr><tr><td></td><td>+</td><td>-</td><td>-</td></tr><tr><td></td><td>-</td><td>+</td><td>+</td></tr></table>	x	-1	0	1		+	-	-		-	+	+	(الف) $y = \frac{x^2 + 3x + 2}{x^2 + 2x + 3}$ $\Delta = b^2 - 4ac = 9 - 12 = -3$ $\Delta = b^2 - 4ac = 4 - 12 = -8$ صورت: $\Delta = b^2 - 4ac = 9 - 12 = -3$ مخرج: $\Delta = b^2 - 4ac = 4 - 12 = -8$ صورت: مثبت	(ب) $y = \frac{x^2 + 3x + 2}{x^2 + 2x + 3}$ $\Delta = b^2 - 4ac = 9 - 12 = -3$ $\Delta = b^2 - 4ac = 4 - 12 = -8$ صورت: مثبت	9																								
x	-1	0	1																																				
	+	-	-																																				
	-	+	+																																				
$y = \sqrt{\frac{x^3 - 1}{x^3 - x}}$ $\frac{x^3 - 1}{x^3 - x} \geq 0$ $\begin{cases} x=-1 \\ x=0 \\ x=1 \end{cases}$ $D_f = (-\infty, -1) \cup (0, 1) \cup (1, +\infty)$	(الف) $y = \sqrt{\frac{x^2 - 1}{x^2 - 3x + 2}}$ $\frac{(x+1)(x-1)}{(x-1)(x-2)} \geq 0$ $\begin{cases} x=-1 \\ x=1 \\ x=2 \end{cases}$ $D_f = (-\infty, -1] \cup (1, 2) \cup (2, +\infty)$	(ب) $y = \sqrt{\frac{x^2 - 1}{x^2 - 3x + 2}}$ $\frac{(x+1)(x-1)}{(x-1)(x-2)} \geq 0$ $\begin{cases} x=-1 \\ x=1 \\ x=2 \end{cases}$ $D_f = (-\infty, -1] \cup (1, 2) \cup (2, +\infty)$	10																																				