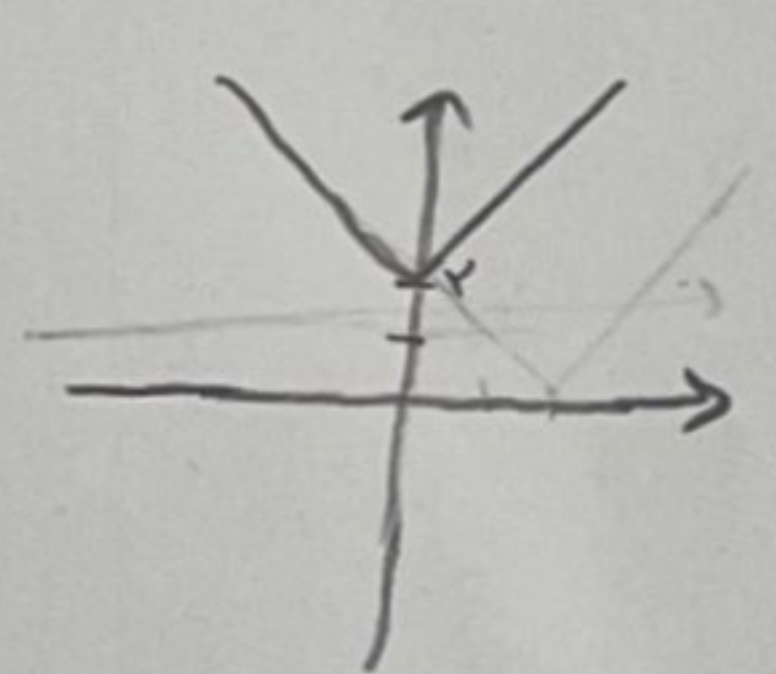
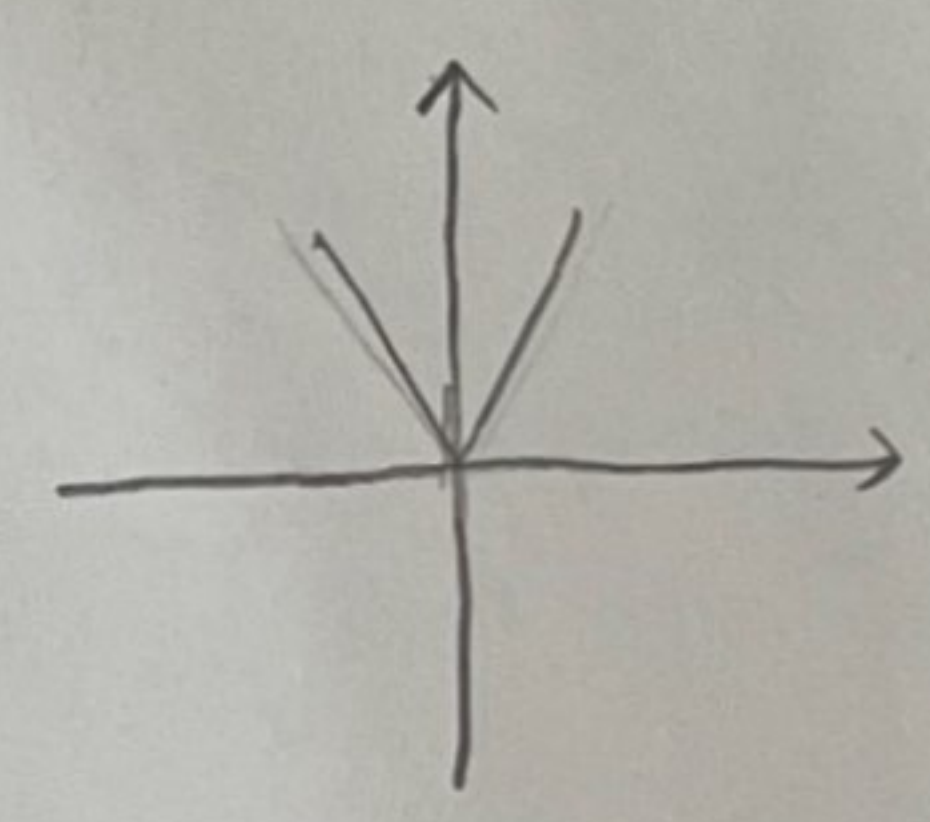
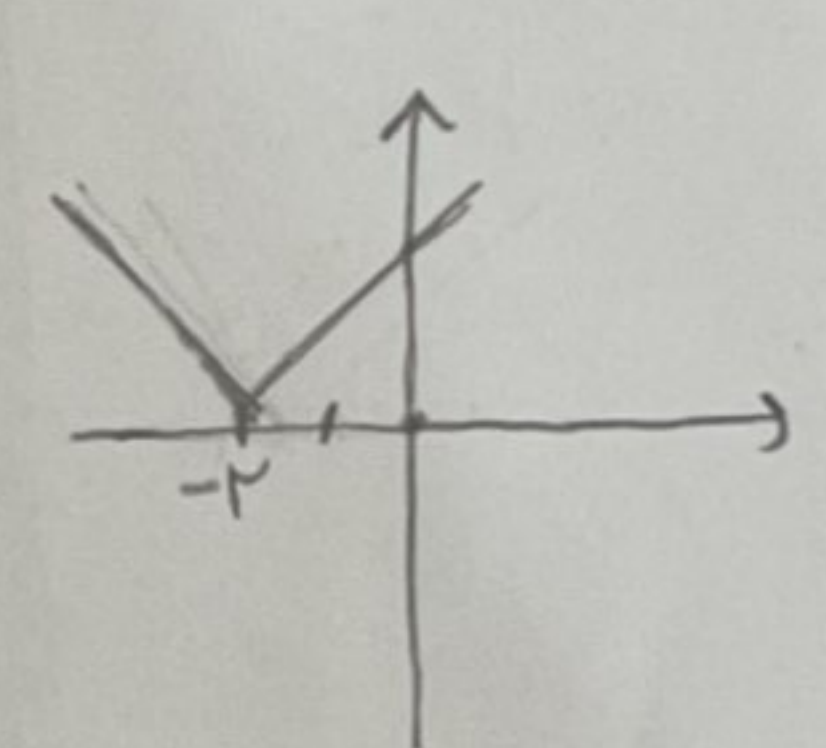
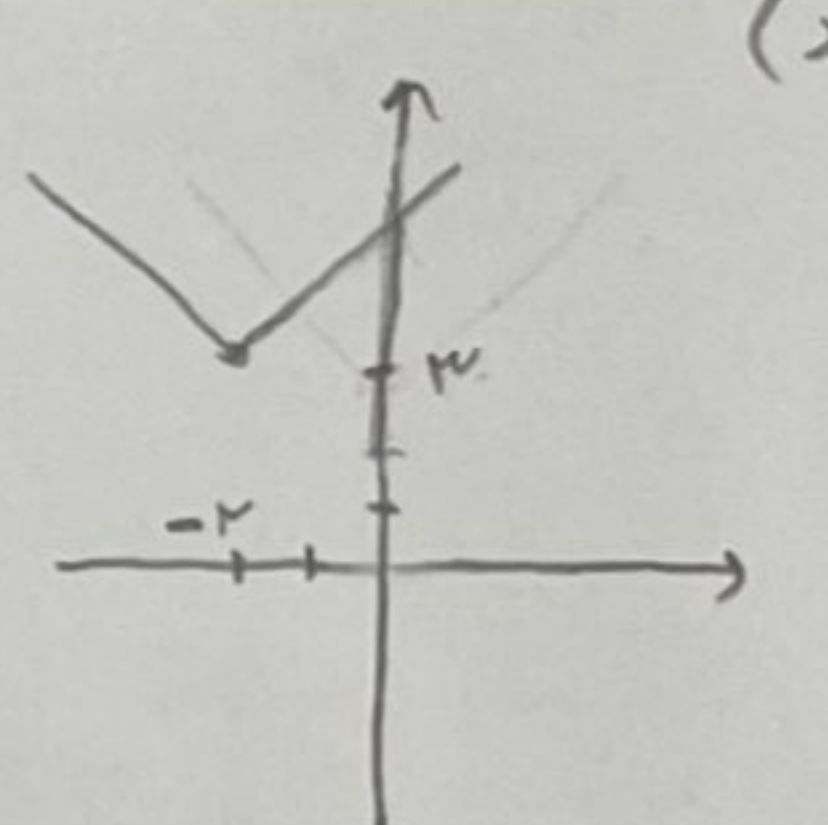
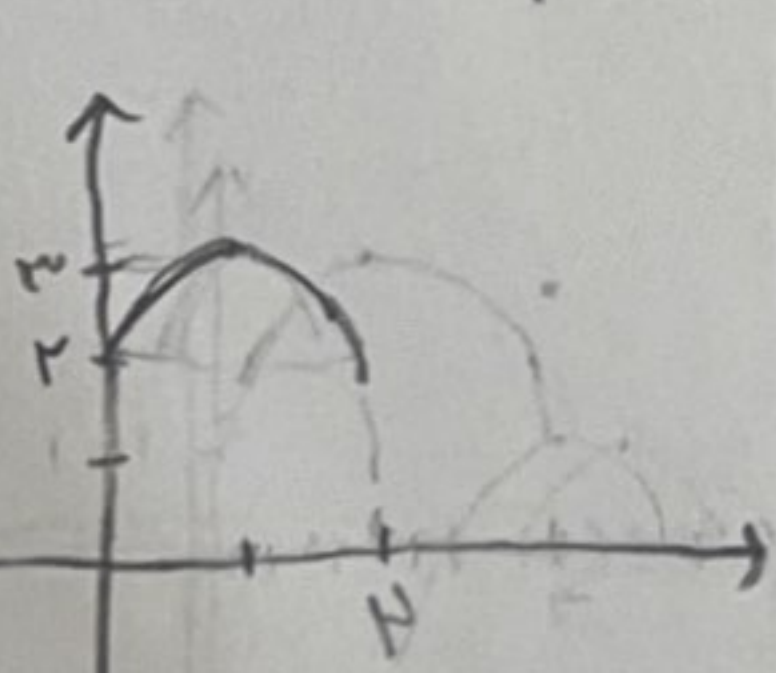
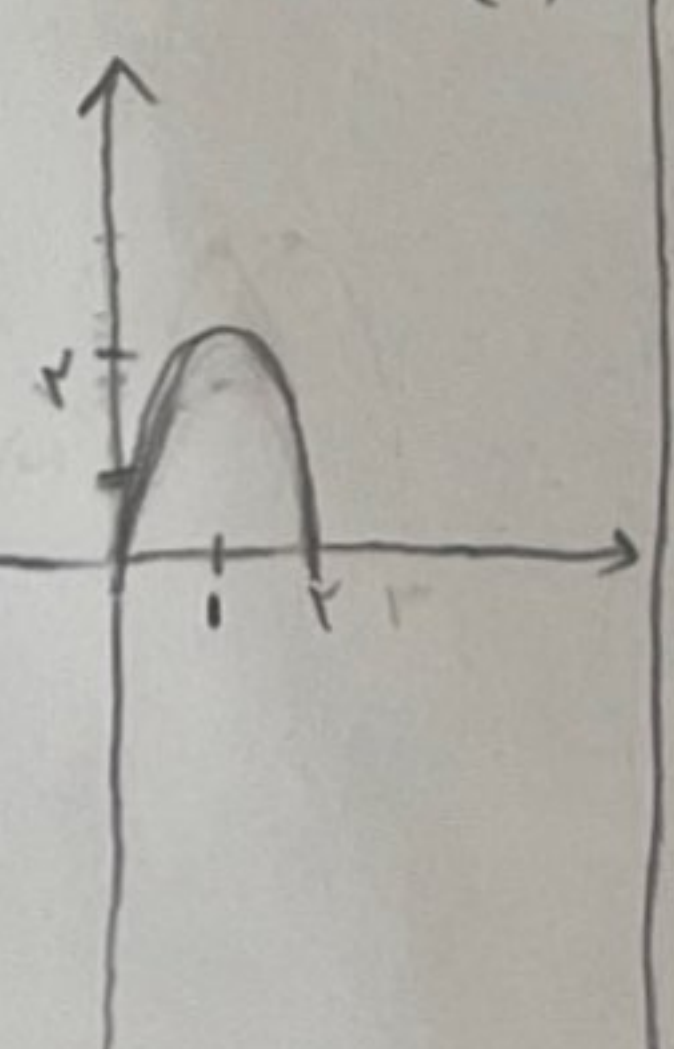
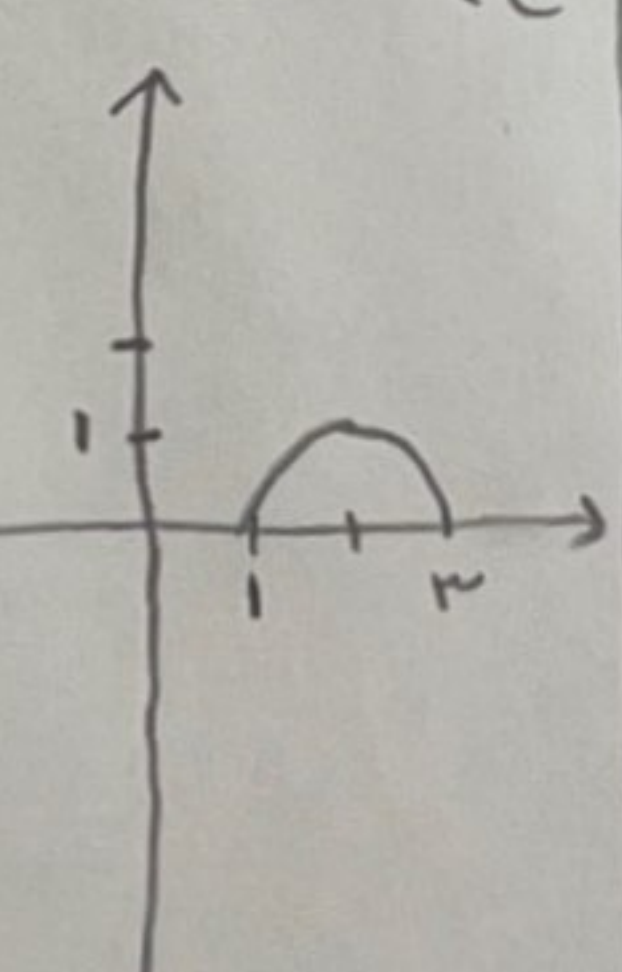
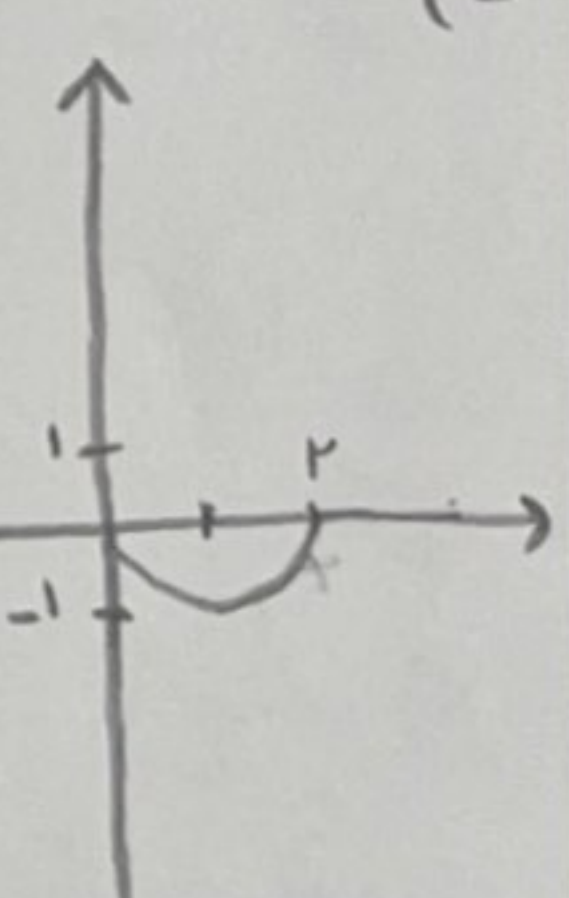


|                                                                                                                                                                                                                           |                                                                               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

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