

۱- به دست آوریم: $y^3 - x = 2x^2 \Rightarrow y_1^3 = 2x^2 + x \rightarrow y_1^3 = y_2^3 \rightarrow y_1 = y_2$ (الف)

۲- $y^3 = 2x^2 + x$

۳- $|x| + x^2 = x + 3 \rightarrow x = 0 \Rightarrow |y| = 3 < y = 3$ (ب)

۴- $\sqrt{x-4} + |y-2| = 0 \Rightarrow \sqrt{x-4} = 0 \Rightarrow x = 4$ و $|y-2| = 0 \Rightarrow y = 2$ (ج)

۵- $x = \cos y \Rightarrow x = 0 \rightarrow \cos y = 0 \Rightarrow y = |0|, |-\pi| \Rightarrow \cos 90^\circ, \cos 270^\circ$ (د)

۱- (الف) $y = \frac{x+4}{x^2-4x} \Rightarrow x^2-4x=0 \Rightarrow x(x-4)=0 \Rightarrow x=0 \vee x=4 \Rightarrow D_f = \mathbb{R} - \{0, 4\}$

۲- (ب) $y = \frac{x+4}{x^2-4x+12} \Rightarrow x^2-4x+12=0 \Rightarrow \Delta = b^2-4ac \Rightarrow (-4)^2 - (4 \times 12) = -16 < 0 \Rightarrow D_f = \mathbb{R}$

۳- (ج) $y = \frac{x+4}{x^2+x+4} \Rightarrow x^2+x+4=0 \Rightarrow \Delta = b^2-4ac = 1^2 - (4 \times 4) = -15 < 0 \Rightarrow D_f = \mathbb{R}$

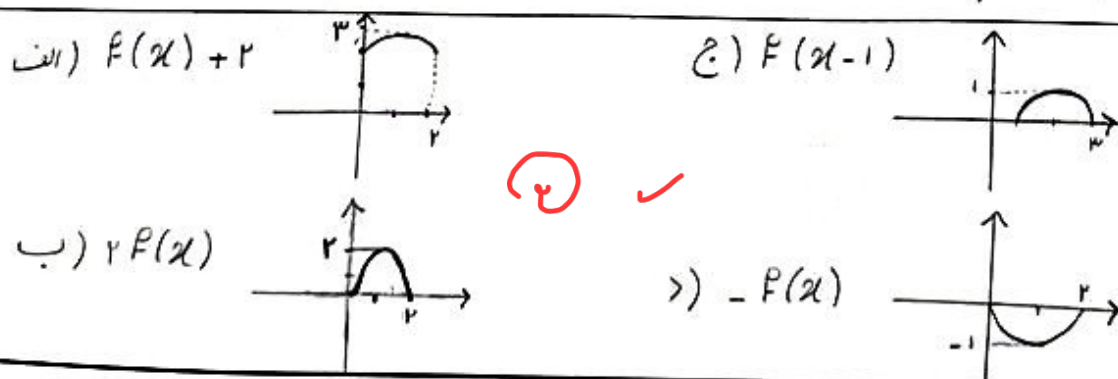
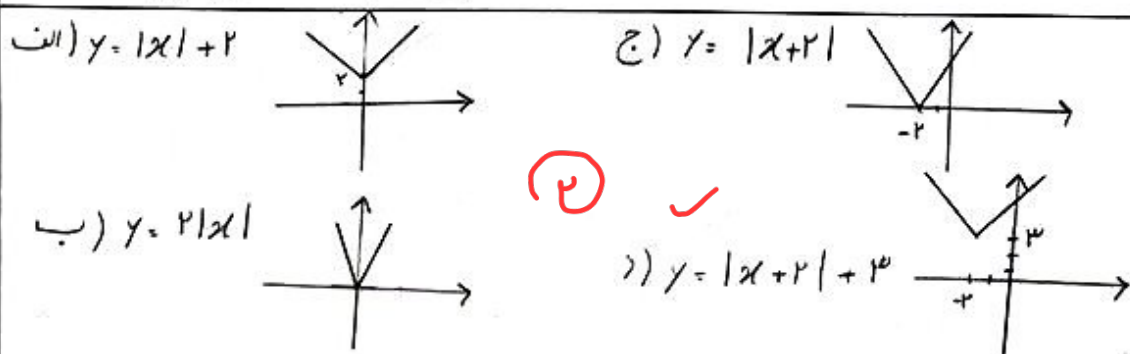
۴- (د) $y = \frac{x+4}{x^2-4x^2} \Rightarrow x^2-4x^2=0 \Rightarrow x^2(x^2-4)=0 \Rightarrow x^2(x+2)(x-2)=0 \Rightarrow x=0 \vee x=-2 \vee x=2 \Rightarrow D_f = \mathbb{R} - \{0, 2, -2\}$

۱- (الف) $y = \sqrt{4-x} + \sqrt{x-2} \Rightarrow \sqrt{4-x} \geq 0 \Rightarrow 4-x \geq 0 \Rightarrow x \leq 4$ و $\sqrt{x-2} \geq 0 \Rightarrow x-2 \geq 0 \Rightarrow x \geq 2 \Rightarrow D_f = [2, 4]$

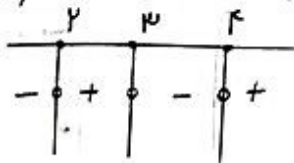
۲- (ب) $y = \frac{3x+1}{x^2+1} \Rightarrow x^2+1=0 \Rightarrow$ این معادله جواب ندارد $\Rightarrow D_f = \mathbb{R}$

۳- (ج) $y = \frac{\sqrt{x-2}}{x-4} \Rightarrow \sqrt{x-2} \geq 0 \Rightarrow x-2 \geq 0 \Rightarrow x \geq 2$ و $x-4 \neq 0 \Rightarrow x \neq 4 \Rightarrow D_f = [2, 4) \cup (4, +\infty)$

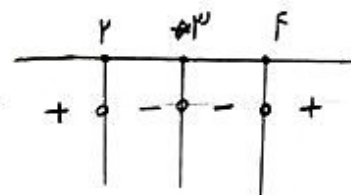
۴- (د) $y = \frac{2x+3}{|x|+x^2} \Rightarrow |x|+x^2=0 \Rightarrow x=0 \Rightarrow D_f = \mathbb{R} - \{0\}$



الف) $y = (x-2)(x-3)(x-4) \rightarrow \frac{x-2=0}{|x=2|} \quad \frac{x-3=0}{|x=3|} \quad \frac{x-4=0}{|x=4|}$



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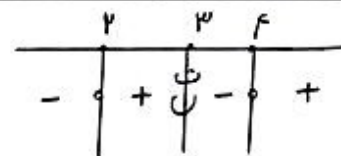


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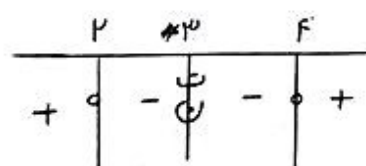
ب) $y = (x-2)(x-3)^2(x-4) \rightarrow \frac{x-2=0}{|x=2|} \quad \frac{x-3=0}{|x=3|} \quad \frac{x-4=0}{|x=4|}$

الف) $y = \frac{(x-2)(x-4)}{x-3} \Rightarrow \frac{x-2=0}{|x=2|} \quad \frac{x-4=0}{|x=4|} \quad \frac{x-3=0}{|x=3|}$

Ⓟ ✓



ب) $y = \frac{(x-2)(x-4)}{(x-3)^2} = \frac{x-2=0}{|x=2|} \quad \frac{x-4=0}{|x=4|} \quad \frac{x-3=0}{|x=3|}$



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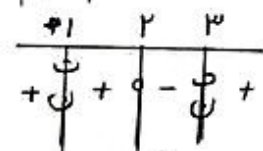
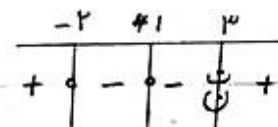
الف) $y = \frac{x^3 - 3x^2 + 2}{x-3} \rightarrow \frac{1-3+2=0}{x-1} \quad \frac{x^3 - 3x^2 + 2}{x-1} \rightarrow (x+2)(x-1)$

$y = \frac{(x-1)(x-1)(x+2)}{x-3} \rightarrow -1$

$3 \leftarrow (x-3)$

$\frac{x-1=0}{|x=1|} \quad \frac{x+2=0}{|x=-2|} \quad \frac{x-3=0}{|x=3|}$

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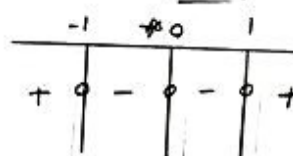


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الف) $y = \frac{x^2 - x^2}{x^2 + x + 2} = \frac{x^2(x^2-1)}{x^2+x+2} = \frac{x^2(x+1)(x-1)}{x^2+x+2} \rightarrow \frac{x=0}{|x=0|} \quad \frac{x+1=0}{|x=-1|} \quad \frac{x-1=0}{|x=1|}$

$\Delta = b^2 - 4ac = 1^2 - (4 \times 2 \times 1) = -7 < 0 \rightarrow \Delta < 0$

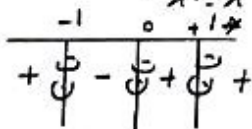
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ب) $y = \frac{x^2 + 3x + 2}{x^2 + 2x + 3} \rightarrow \Delta = b^2 - 4ac = 3^2 - (4 \times 1 \times 2) = 9 - 8 = 1 > 0 \rightarrow \Delta > 0$
 $x^2 + 2x + 3 \rightarrow \Delta = b^2 - 4ac = 2^2 - (4 \times 1 \times 3) = 4 - 12 = -8 < 0 \rightarrow \Delta < 0$
 $x \in \mathbb{R} \Rightarrow x > 0$

الف) $y = \sqrt{\frac{x^3-1}{x^3-x}} = \sqrt{\frac{(x-1)(x^2+x+1)}{x(x^2-1)}} = \sqrt{\frac{(x-1)(x^2+x+1)}{(x)(x+1)(x-1)}} \rightarrow \Delta = b^2 - 4ac = 1^2 - (4 \times 1 \times 1) = -3 < 0$

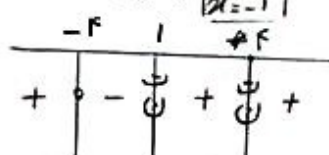


$\therefore Df. (-\infty, -1) \cup (0, 1) \cup (1, +\infty) = (-\infty, -1) \cup (0, 1) \cup (1, +\infty)$

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ب) $y = \sqrt{\frac{x^2-1}{x^2-5x+4}} = \sqrt{\frac{(x+1)(x-1)}{(x-1)(x-4)}} = \sqrt{\frac{x+1}{x-4}}$

$\frac{x+1=0}{|x=-1|} \quad \frac{x-4=0}{|x=4|}$



$Df. (-\infty, -1] \cup (4, 4) \cup (4, +\infty)$

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