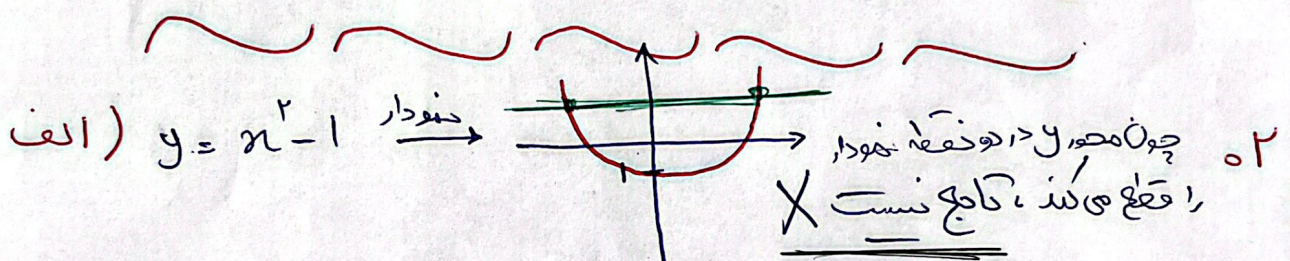


الف) $y^3 = 2x^2 - 1 \rightarrow \begin{cases} y_1^3 = 2x_1^2 - 1 \\ y_2^3 = 2x_2^2 - 1 \end{cases} \xrightarrow{x_1=x_2} y_1^3 = y_2^3$
 $\downarrow \sqrt[3]{}$
 $y_1 = y_2$ تابع است ✓

ب) $y^3 + y = 3x^2 - 1 \rightarrow \begin{cases} y_1^3 + y_1 = 3x_1^2 - 1 \\ y_2^3 + y_2 = 3x_2^2 - 1 \end{cases} \xrightarrow{x_1=x_2} y_1^3 + y_1 = y_2^3 + y_2$
 $\downarrow$
 $(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) + 1 = 0$ ← $y_1^3 - y_2^3 + y_1 - y_2 = 0$
 همواره مثبت
 $y_1 - y_2 = 0 \rightarrow y_1 = y_2$ تابع است ✓



ب) $|y| + xy = x^2 + 1$ مثال نقض $|y| + 0 = 0 + 1$
 $x = 0$ $|y| = 1 \rightarrow y = \pm 1$

چون y هم می تواند + و هم - باشد پس تابع نیست X

ج) $y^3 + x^3 = 2x - 1$ تعریف ریاضی $\begin{cases} y_1^3 = 2x_1 - 1 - x_1^3 \\ y_2^3 = 2x_2 - 1 - x_2^3 \end{cases}$
 $\xrightarrow{x_1=x_2} y_1^3 = y_2^3 \rightarrow y_1 = y_2$ تابع است ✓

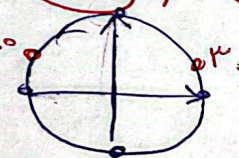
د) $\sqrt[3]{y} + \sqrt[3]{x} = 2$ تعریف ریاضی $\begin{cases} \sqrt[3]{y_1} = 2 - \sqrt[3]{x_1} \\ \sqrt[3]{y_2} = 2 - \sqrt[3]{x_2} \end{cases}$
 $\xrightarrow{x_1=x_2} \sqrt[3]{y_1} = \sqrt[3]{y_2} \rightarrow y_1 = y_2$ تابع است ✓

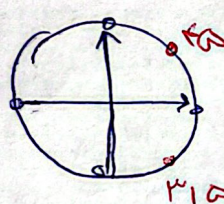
$$\text{الف) } \tan \frac{\pi}{3} = \frac{\sin}{\cos} 60^\circ = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}$$

$$\text{ب) } \cot \frac{\pi}{4} = \frac{\cos}{\sin} 45^\circ = \frac{-\frac{\sqrt{2}}{2}}{-\frac{1}{2}} = \sqrt{2}$$

$$\text{ج) } \tan 135^\circ = \frac{\sin}{\cos} 135^\circ = \frac{-\frac{1}{2}}{\frac{\sqrt{2}}{2}} = -\frac{1}{\sqrt{2}} \xrightarrow{\text{مخرج 2}} -\frac{\sqrt{2}}{2}$$

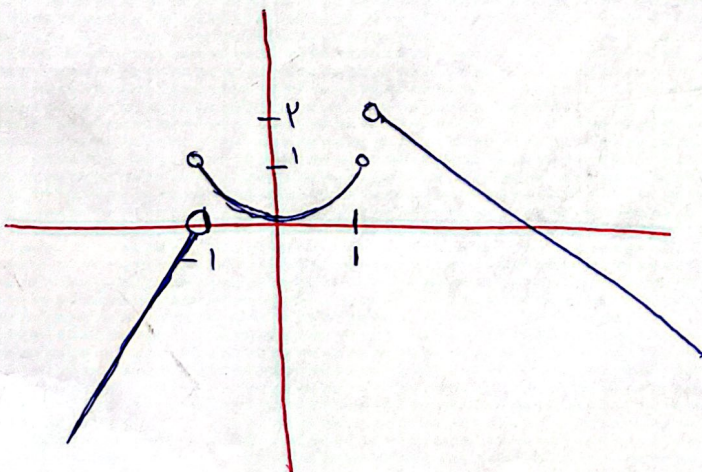
$$\text{د) } \cot 180^\circ = \frac{\cos}{\sin} 180^\circ = \frac{-1}{0} \text{ تعریفاً نشده است}$$

$$\text{الف) } \sin \alpha = \frac{1}{2} \quad \alpha = \left\{ \frac{\pi}{6}, \frac{5\pi}{6} \right\}$$


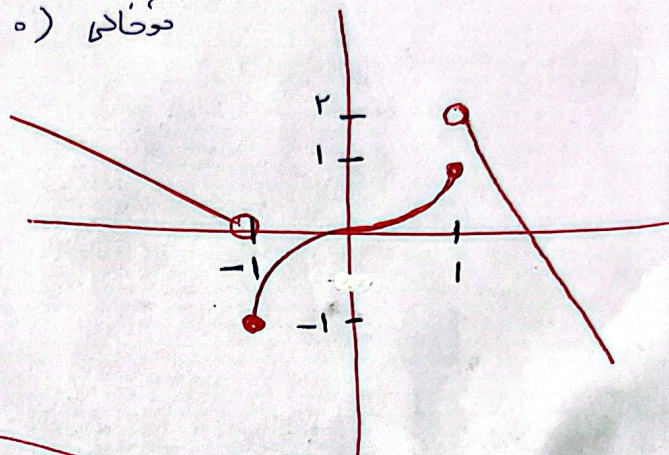
$$\text{ب) } \cos \alpha = \frac{\sqrt{2}}{2} \quad \alpha = \left\{ \frac{\pi}{4}, \frac{7\pi}{4} \right\}$$


$$f(n) = \begin{cases} -2n+4 & n > 1 \\ n^2 & -1 < n < 1 \\ n+1 & n < -1 \end{cases}$$

$n=1 \rightarrow y = -2(1)+4 = 2 \rightarrow (1, 2)$
 به خود او 2 در نمودار نیست چون چون 1
 توجه: $(1, 1)$ و $(-1, 1)$
 توجه: $(-1, 0)$



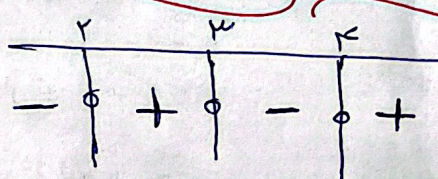
$$f(x) = \begin{cases} -x+3 & x > 1 \rightarrow (1, 2) \text{ موقالی} \\ x^3 & -1 \leq x \leq 1 \rightarrow (1, 1), (1, -1) \text{ تویه} \\ -x-1 & x < -1 \rightarrow (-1, 0) \text{ موقالی} \end{cases}$$



الف) $\{2, 3, 4\}$ ششها

$$y \geq 0 \rightarrow [2, 3] \cup [4, +\infty)$$

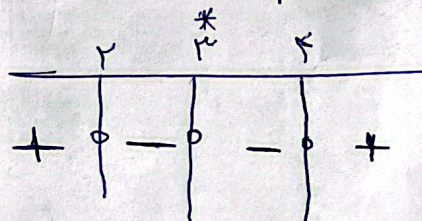
$$y < 0 \rightarrow (-\infty, 2) \cup (3, 4)$$



ب) $\{2, 3, 4\}$ ششها

$$y \geq 0 \rightarrow [-\infty, 2] \cup [4, +\infty)$$

$$y < 0 \rightarrow (2, 4)$$



الف) $y = \frac{(x-2)(x-4)}{x-3}$

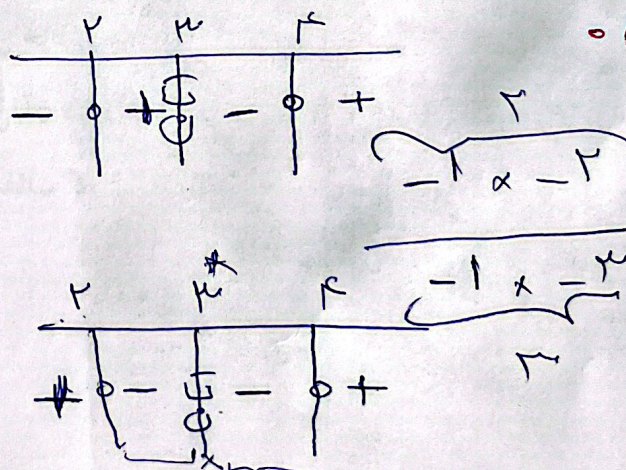
$$y \geq 0 \rightarrow [2, 3) \cup [4, +\infty)$$

$$y < 0 \rightarrow (-\infty, 2) \cup (3, 4)$$

ب) $y = \frac{(x-2)(x-4)}{(x-3)^2}$

$$y \geq 0 \rightarrow (-\infty, 2] \cup [4, +\infty)$$

$$y < 0 \rightarrow (2, 3) \cup (3, 4) \cup (4, +\infty) - \{3\}$$



الف) $\frac{x^2 - 3x + 2}{x-3} \rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$$y \geq 0 \rightarrow [1, 2] \cup (3, +\infty)$$

$$y < 0 \rightarrow (-\infty, 1) \cup (2, 3) \cup (3, +\infty)$$

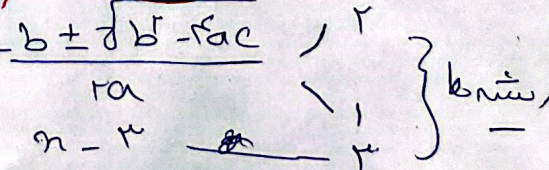


Diagram illustrating the addition of three fractions:

$$\frac{1}{2} + \frac{1}{2} - \frac{1}{2} = \frac{1}{2}$$

The diagram shows three vertical lines representing the denominators 2, 2, and 2. The numerators are 1, 1, and -1 respectively. The result is shown as a single vertical line with a numerator of 1 and a denominator of 2.

$$y \in \rightarrow (r, \mu)$$

$n^r + n + r$

Diagram illustrating the addition of two numbers in base 10, showing the carry-over process. The top row shows the sum of the digits in each column, and the bottom row shows the resulting digits after carrying over.

1	0	1	1	1
+	0	0	-	+

$$y_{Z,0} \rightarrow (-\infty, -1] \cup [1, +\infty)$$

$$Y^{\circ} \rightarrow (-1, 0) \cup (0, 1)$$

→ $n + n + n > 0$ صورت صواب است؛ زیرا 0 بزرگتر از 0 است.

۱۸) ضریب نیزه‌شماره‌ای را از Δ حذف می‌کنیم و داریم:

$$n^2 + 2n + 3 > 0$$

صفر Δ را می‌یابیم:

$$\Delta = 4 - 12 = -8 < 0$$

پس $n^2 + 2n + 3 > 0$ همیشه برقرار است.