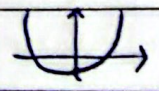


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14, 5

الف) تابع است $y^3 = 2x^2 - 1 \rightarrow y_1^3 = 2x_1^2 - 1 \xrightarrow{x_1 = x_2} y_1^3 + 1 = y_2^3 + 1 \rightarrow y_1^3 = y_2^3 \rightarrow y_1 = y_2$
 $y_2^3 = 2x_2^2 - 1$

ب) $y^3 + y = 3x^2 - 1$ ؟ ارامه؟ 1, 5
 $y_1^3 + y_1 = 3x_1^2 - 1 \xrightarrow{x_1 = x_2} y_1(y_1^2 - 1) = y_2(y_2^2 - 1) \rightarrow y_1 = y_2$ تابع است
 $y_2^3 + y_2 = 3x_2^2 - 1$ یابسی صغه بخون

الف) $y = x^2 - 1$  تابع است خط موازی محور y نمودار را یکبار قطع می کند

تابع نیست $|y| + xy = x^2 + 1 \xrightarrow{x=0} |y| + 0 \cdot y = 0^2 + 1 \rightarrow |y| = 1 \rightarrow y = \pm 1$

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

د) تابع است $\sqrt[3]{y} + \sqrt[3]{x} = 2 \rightarrow \sqrt[3]{y_1} + \sqrt[3]{x_1} = 2 \xrightarrow{x_1 = x_2} \sqrt[3]{y_1} + \sqrt[3]{x_1} = \sqrt[3]{y_2} + \sqrt[3]{x_2} \rightarrow \sqrt[3]{y_1} = \sqrt[3]{y_2} \rightarrow y_1 = y_2$

الف) $\tan \frac{\pi}{3} : \tan 60^\circ \rightarrow \frac{\sin}{\cos} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}$ (2) ✓

ج) $\tan 330^\circ \rightarrow \frac{\sin}{\cos} = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}} = -\frac{1}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$

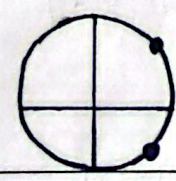
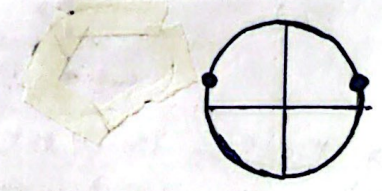
ب) $\cot \frac{\sqrt{\pi}}{6} : \cot 11^\circ \rightarrow \frac{\cos}{\sin} = \frac{-\frac{\sqrt{3}}{2}}{-\frac{1}{2}}$

د) $\cot 180^\circ \rightarrow \frac{\cos}{\sin} = \frac{1}{0} \rightarrow$ تعریف نشده

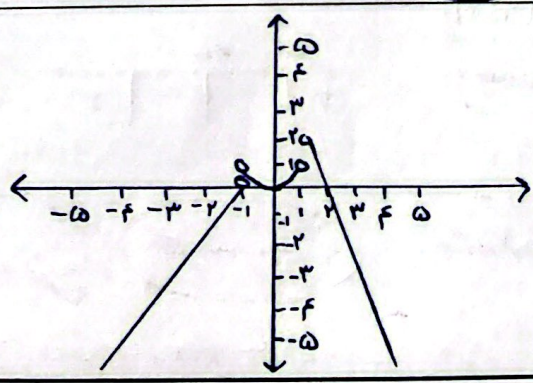
الف) $\sin \alpha = \frac{1}{2} \rightarrow \alpha = \left\{ 2k\pi + \frac{\pi}{6}, 2k\pi + \frac{5\pi}{6} \right\}$

سوال α را در بازه $0 < \alpha < 2\pi$ خواسته

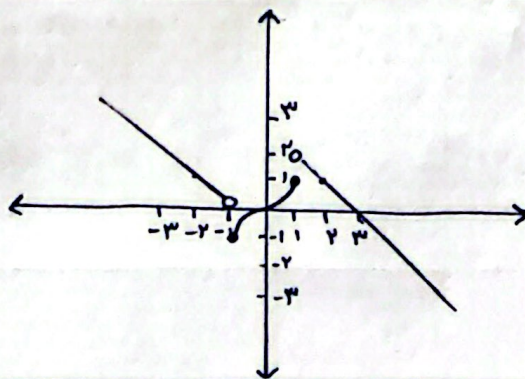
ب) $\cos \alpha = \frac{\sqrt{2}}{2} \rightarrow \alpha = \left\{ 2k\pi \pm \frac{\pi}{4} \right\}$ (2) ✓



(2) ✓



(2) ✓



6

الف) $y = (x-2)(x-3)(x-4)$

2	3	4
-	+	-
+	-	+

ب) $y = (x-2)(x-3)^2(x-4)$

2	3	4
+	-	-
-	+	+

(2) ✓

7

الف) $y = \frac{(x-2)(x-4)}{x-3}$

2	3	4
-	+	-
+	-	+

(2) ✓

ب) $y = \frac{(x-2)(x-4)}{(x-3)^2}$

2	3	4
+	-	-
-	+	+

8

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

ب) $y = \frac{x^3 - 3x^2 + 2}{x^3 - 4x^2 + 3} = \frac{(x-1)(x-2)}{(x-1)(x-3)} \rightarrow \frac{x-2}{x-3}$

(2) ✓

9

الف) $y = \frac{x^4 - x^2}{x^2 + 9x + 2} \rightarrow \frac{x^2(x^2 - 1)}{x^2 + 9x + 2}$

ریشه ندارد

-1	0	1
+	-	+
-	+	-

$\Delta = 1 - 1 = -7 < 0$

(2) ✓

ب) $y = \frac{x^2 + 3x + 4}{x^2 + 2x + 3} \rightarrow \frac{x^2 + 3x + 4}{x^2 + 2x + 3}$

ریشه ندارد
ریشه ندارد

ریشه مثبت

$\Delta = 9 - 16 = -7 < 0$

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

10

$$y_1^3 + y_1 = 3x_1^2 - 1$$

$$y_2^3 + y_2 = 3x_2^2 - 1 \xrightarrow{x_1 = x_2} \rightarrow$$

$$y_1^3 + y_1 = 3x_1^2 - 1$$

$$y_2^3 + y_2 = 3x_2^2 - 1$$

ا ب ←

$$\rightarrow y_1^3 + y_1 = y_2^3 + y_2 \rightarrow$$

$$\rightarrow (y_1^3 - y_2^3) + (y_1 - y_2) = 0 \rightarrow (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) + (y_1 - y_2) = 0$$

$$\rightarrow (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + 1) = 0$$

$$y_1 = y_2 \quad \checkmark \rightarrow \text{تابع است}$$

$$y_1^3 + y_2 y_1 + y_2^2 + 1 = 0 \rightarrow \Delta = (y_2)^2 - 4(y_2^2 + 1) = -3y_2^2 + 4 \rightarrow \Delta < 0$$

✓ ریشه ندارد