

الف) $y^3 = 2u^2 - 1$

$y_1^3 = 2u_1^2 - 1$
 $y_2^3 = 2u_2^2 - 1 \xrightarrow{u_2 = u_1} y_1^3 = y_2^3 \Rightarrow y_1 = y_2 \Rightarrow$ تابع است

ب) $y^3 + y = 2u^2 - 1 \Rightarrow y_1^3 + y_1 = 2u_1^2 - 1$
 $y_2^3 + y_2 = 2u_2^2 - 1 \xrightarrow{u_2 = u_1} y_1^3 + y_1 = y_2^3 + y_2$

$\Rightarrow y_1^3 - y_2^3 = y_2 - y_1$

$(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) - y_2 + y_1 = 0$

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

$0 = 6^2 - 4ae \rightarrow y_2^2 - 4(y_2^2 + 1) = 0 \Rightarrow 1 + y_1^2 + y_2^2 + y_1 y_2 = 0$

$0 = y_2^2 - 4y_2^2 - 4 = -3y_2^2 - 4 < 0$ ② $\Rightarrow$ عبارت تابع است از ① و ②

الف) $y = u^2 - 1 \rightarrow$ $\Rightarrow$ چون خط مماسی و در این نقطه مقدار از سطح صاف تابع است

ب) $|y| + 4y = u^2 + 1$
 مبداء است که از مثال نقض اگر $u = 0$ باشد و در این حالت $|y| + 4y = 1$ را حاصل می شود
 یعنی $|y| = 1 \Leftrightarrow y = \pm 1$ تابع نیست

ج) $y^4 + u^2 = 2u - 1$

$y_1^4 = 2u_1 - 1 - u_1^2$
 $y_2^4 = 2u_2 - 1 - u_2^2 \xrightarrow{u_2 = u_1} y_1^4 = y_2^4 \Rightarrow y_1 = y_2$ تابع است

$y_2^4 = 2u_2 - 1 - u_2^2$

$\sqrt[4]{y_1} + \sqrt[4]{y_2} = 2$

$\sqrt[4]{y_1} = -\sqrt[4]{y_2} + 2 \xrightarrow{u_2 = u_1} \sqrt[4]{y_1} = \sqrt[4]{y_2} \Rightarrow y_1 = y_2$ تابع است

$\sqrt[4]{y_2} = -\sqrt[4]{y_1} + 2$

الف) $\tan \frac{\pi}{4} \rightarrow \frac{\frac{\sqrt{2}}{2}}{\frac{1}{2}} = \sqrt{2}$

$\tan \frac{\pi}{4} = \frac{\sin \frac{\pi}{4}}{\cos \frac{\pi}{4}} = \frac{\frac{\sqrt{2}}{2}}{\frac{1}{2}} = \sqrt{2}$

ب) $\cot \frac{\sqrt{2}\pi}{4} \Rightarrow \frac{\cos \frac{\sqrt{2}\pi}{4}}{\sin \frac{\sqrt{2}\pi}{4}} = \frac{\cos 21.0}{\sin 21.0} = \frac{\frac{\sqrt{2}}{2}}{\frac{1}{2}} = \sqrt{2}$

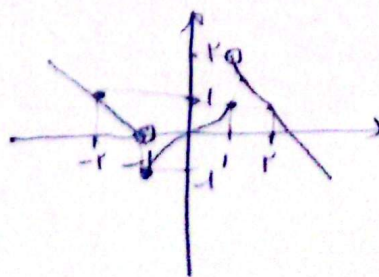
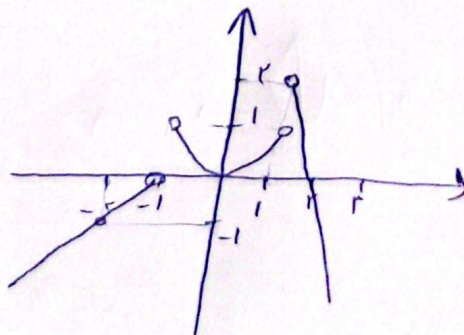
$= \frac{-\frac{\sqrt{2}}{2}}{-\frac{1}{2}} = \sqrt{2}$

ج) $\tan \pi = \frac{\sin \pi}{\cos \pi} = \frac{0}{-1} = 0$

د) $\cot 110 = \frac{\cos 110}{\sin 110} = \frac{-0.342}{0.9397} = -0.364$

الف) $\sin a = \frac{1}{2} \rightarrow a = \frac{\pi}{6} \text{ و } a = \frac{5\pi}{6}$

ب) $\cos a = \frac{\sqrt{2}}{2} \rightarrow a = \frac{\pi}{4} \text{ و } \frac{7\pi}{4} = a$



الف) $y = (u-2)(u-3)(u-4)$

$(-\infty, 2) \cup (3, 4) < 0$ ✓
 $[2, 3] \cup [4, +\infty) \geq 0$

ب) $y = (u-2)(u-3)^2(u-4)$

$(-\infty, 2] \cup [4, +\infty) \cup \{3\} \geq 0$
 $(2, 4) < 0$

الف) $y = \frac{(u-2)(u-4)}{u-3}$

$(-\infty, 2) \cup (3, 4) < 0$
 $[4, +\infty) \cup [2, 3] \geq 0$

ب) $y = \frac{(u-2)(u-4)}{(u-3)^2}$

$(2, 4) - \{3\} < 0$
 $[4, +\infty) \cup (-\infty, 2] \geq 0$

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

$(-\infty, -2] \cup (3, +\infty) \geq 0$
 $(-2, 3) < 0$

ب) (مع)

کیفه

برهان

$$y = \frac{u^2 - ru + r}{u^2 - ru + r} = \frac{(u-r)(u-1)}{(u-r)(u-1)}$$

x	1	r	r
y	$+$	$+$	$+$

$$الف) y = \frac{u^2 - u^2}{u^2 + u + r} = \frac{u^2(u-1)}{u^2 + u + r} = \frac{u^2(u-1)(u+1)}{u^2 + u + r}$$

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

u	-1	1
y	$+$	$+$

$$ب) y = \frac{u^2 + ru + r}{u^2 + ru + r} = \frac{u^2 + ru + r}{u^2 + ru + r}$$

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

x	$-\infty$	$+\infty$
y	$+$	$+$

معادله درجه دوم

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