

الف)  $(9, x+2y)$  و  $(3x-y, -4) = x \begin{cases} 3x-y=9 \\ x+2y=-4 \Rightarrow -3x-2y=12 \\ -7y=21 \Rightarrow y=-3, x=-4-2(-3)=2 \end{cases} \Rightarrow \boxed{\frac{x}{y} = \frac{-2}{3}}$

ب)  $(-1, -3)$  و  $(\frac{1}{x} - \frac{1}{y}, \frac{5}{x} - \frac{1}{y}) = \begin{cases} \frac{1}{x} - \frac{1}{y} = -1 \Rightarrow y-x = -x \Rightarrow y = -3x \\ \frac{5}{x} - \frac{1}{y} = -3 \Rightarrow 5y - 1x = -3xy \\ 3y - 3x = 5y - 1x \Rightarrow 2x = 2y \Rightarrow y = x \end{cases} \Rightarrow \boxed{\frac{x}{y} = \frac{x}{2x} = \frac{1}{2}}$

۲  $f(a) + 2f(2) = 3f(1) \Rightarrow 2a + 2(b) = 3(-2) \Rightarrow 2b = -6 - 2a \Rightarrow b = -3 - a$   $\left\{ \begin{matrix} (1, a+1) \\ (1, -2) \end{matrix} \right\}$  مؤلفه های اول یکسان هستند پس برای تابع بودن باید مؤلفه های دوم هم یکسان باشند

$a+1 = -2 \Rightarrow a = -3$   $\Rightarrow b = -3 - (-3) = 0$

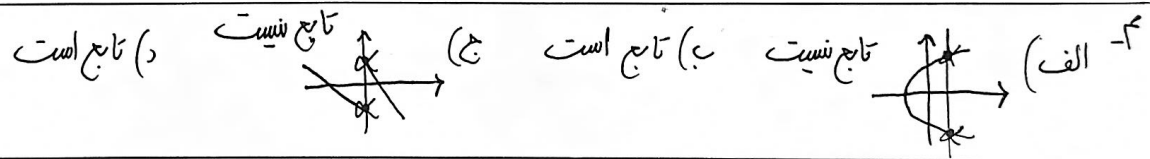
۳  $f = \left\{ \underbrace{(-1, m^2-3m)}_{\textcircled{1}}, \underbrace{(3, 5)}_{\textcircled{2}}, \underbrace{(-1, -2)}_{\textcircled{1}}, \underbrace{(m+1, 6)}_{*}, \underbrace{(2, 4)}_{*}, \underbrace{(m^2+2, m+1)}_{*} \right\}$

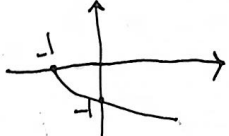
$\textcircled{1} \Rightarrow m^2 - 3m = -2 \Rightarrow m^2 - 3m + 2 = 0 \Rightarrow (m-2)(m-1) = 0$

تابع نیست  $\propto (3, 6)$  و  $(3, 5)$

تابع نیست  $\propto (2, 6)$  و  $(2, 4)$

به ازای هیچ مقدار  $m$  ممکن نیست تابع باشد



۵ الف)  $y = -\sqrt{x+1}$  

$x = \frac{y}{\sqrt{1-y^2}} \Rightarrow \sqrt{1-y^2} = y \Rightarrow |1-y^2| = y^2 \Rightarrow$

بافتض این شرط که زیر رادیکال نامنفی باشد یعنی  $1-y^2 \geq 0 \Rightarrow 1-y^2 = y^2 \Rightarrow y^2 = \frac{1}{2} \Rightarrow y = \pm \frac{1}{\sqrt{2}} = \pm \frac{\sqrt{2}}{2} \Rightarrow$   $\boxed{\alpha}$  نامنفی را بررسی می کنیم

۶ الف)  $|y| = x \Rightarrow y = \pm x$   $\boxed{\alpha}$   $\left\{ \begin{matrix} \text{ب) } y^3 + 3y^2 + 3y + x = 0 \Rightarrow x_1^3 + 3x_1^2 + 3x_1 = y_1^3 + 3y_1^2 + 3y_1 = 1 \\ y_1^3 - y_2^3 = 3y_2^2 - 3y_1^2 + 3y_2 - 3y_1 \Rightarrow (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2) = 3(y_2 - y_1)(y_2 + y_1 + 1) \Rightarrow \\ (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2) + 3(y_1 - y_2)(y_2 + y_1 + 1) = 0 \Rightarrow (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2 + 3y_2 + 3y_1 + 3) = 0 \Rightarrow \\ \textcircled{1} y_1 - y_2 = 0 \Rightarrow y_1 = y_2 \\ \textcircled{2} y_1^2 + y_1(y_2 + 3) + y_2^2 + 3y_2 + 3 = 0 \Rightarrow \Delta = (y_2 + 3)^2 - 4(y_2^2 + 3y_2 + 3) = y_2^2 + 9 + 6y_2 - 4y_2^2 - 12y_2 - 12 = \\ -3y_2^2 - 6y_2 - 3 \Rightarrow -3(y_2^2 + 2y_2 + 1) = -3(y_2 + 1)^2 \Rightarrow \Delta \leq 0 \Rightarrow \textcircled{1} \Delta < 0 \Rightarrow \textcircled{2} \Delta = 0 \Rightarrow y_2 = -1 \Rightarrow y_1^2 + 2y_1 + 1 = 0 \Rightarrow y_1 = -1 = y_2 \Rightarrow \end{matrix} \right.$   $\boxed{\alpha}$   $\left\{ \begin{matrix} \text{ب) } y^3 + 3y^2 + 3y + x = 0 \Rightarrow x_1^3 + 3x_1^2 + 3x_1 = y_1^3 + 3y_1^2 + 3y_1 = 1 \\ y_1^3 - y_2^3 = 3y_2^2 - 3y_1^2 + 3y_2 - 3y_1 \Rightarrow (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2) = 3(y_2 - y_1)(y_2 + y_1 + 1) \Rightarrow \\ (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2) + 3(y_1 - y_2)(y_2 + y_1 + 1) = 0 \Rightarrow (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2 + 3y_2 + 3y_1 + 3) = 0 \Rightarrow \\ \textcircled{1} y_1 - y_2 = 0 \Rightarrow y_1 = y_2 \\ \textcircled{2} y_1^2 + y_1(y_2 + 3) + y_2^2 + 3y_2 + 3 = 0 \Rightarrow \Delta = (y_2 + 3)^2 - 4(y_2^2 + 3y_2 + 3) = y_2^2 + 9 + 6y_2 - 4y_2^2 - 12y_2 - 12 = \\ -3y_2^2 - 6y_2 - 3 \Rightarrow -3(y_2^2 + 2y_2 + 1) = -3(y_2 + 1)^2 \Rightarrow \Delta \leq 0 \Rightarrow \textcircled{1} \Delta < 0 \Rightarrow \textcircled{2} \Delta = 0 \Rightarrow y_2 = -1 \Rightarrow y_1^2 + 2y_1 + 1 = 0 \Rightarrow y_1 = -1 = y_2 \Rightarrow \end{matrix} \right.$   $\boxed{\alpha}$

$$f(x) = \frac{x^{\psi} + \epsilon x + \omega}{x^{\psi} + \epsilon x + \nu} = \frac{(x+\psi)^{\psi} + 1}{(x+\psi)^{\psi} + \psi} \stackrel{x=\sqrt{\psi}-\psi}{=} \frac{(\sqrt{\psi}-\psi+\psi)^{\psi} + 1}{(\sqrt{\psi}-\psi+\psi)^{\psi} + \psi} = \frac{\psi+1}{\psi+\psi} = \boxed{\frac{\psi}{\psi}}$$

-V

$$f(x) = x^{\psi} + ax + b \quad \left. \begin{array}{l} \xrightarrow{1-\epsilon} \\ \xrightarrow{-\epsilon} \end{array} \right\} \begin{array}{l} -\epsilon = -\psi - a \Rightarrow a = 1 \\ -\epsilon = -1 - 1 + b \Rightarrow b = -2 \end{array} \Rightarrow \left\{ \begin{array}{l} x^{\psi} + x - 2 = \psi x - 1 \Rightarrow x^{\psi} - \psi x - 1 = 0 \Rightarrow x(x-1)(x+1) - (x+1) = 0 \Rightarrow \\ (x+1)(x^{\psi} - x - 1) = 0 \Rightarrow \end{array} \right. \left\{ \begin{array}{l} \textcircled{1} x+1=0 \Rightarrow x=-1 \text{ این نقطه داده شده و} \\ \textcircled{2} x^{\psi} - x - 1 = 0 \Rightarrow \text{این نقطه دیگر را می خواهیم} \end{array} \right.$$

$S = \frac{-b}{a} = \boxed{1}$

-A

$$f = \left\{ \underbrace{(2, a+b)}_{\textcircled{2}}, \underbrace{(1, 2a)}_{\textcircled{1}}, \underbrace{(-1, a-2b+1)}_{\textcircled{3}} \right\} \Rightarrow \textcircled{1}, \textcircled{2} \Rightarrow a+b = 2a \Rightarrow a = b \left\{ \textcircled{1}, \textcircled{3} \Rightarrow a - 2b + 1 = 2a \Rightarrow 1 = \psi a \Rightarrow \alpha = \frac{1}{\psi} \right.$$

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$$f(x) = \frac{\epsilon x^{\psi} - ax + C + 1}{bx + \psi} = x \Rightarrow \epsilon x^{\psi} - ax + C + 1 = bx^{\psi} + \psi x \Rightarrow x^{\psi}(\epsilon - b) + x(-a - \psi) + C + 1 = 0 \Rightarrow \begin{array}{l} \epsilon - b = 0 \Rightarrow b = \epsilon \\ -a - \psi = 0 \Rightarrow a = -\psi \\ C + 1 = 0 \Rightarrow C = -1 \end{array}$$

$\Rightarrow \boxed{a+b+C=0}$

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