

الف) $(3x - y, -4), (x + 2y, 9)$ $\begin{cases} 3x - y = 9 \\ x - 3 \rightarrow x + 2y = -4 \end{cases} \Rightarrow \begin{cases} 3x - y = 9 \\ -3x - 6y = 12 \end{cases} \Rightarrow -7y = 21 \Rightarrow y = -3, x = 2$

$\frac{x}{y} = \frac{2}{-3}$

$\frac{1}{x} - \frac{1}{y} = -1 \xrightarrow{x-xy} y - x = xy$

ب) $(-1, -3), (\frac{1}{x} - \frac{1}{y}, \frac{5}{x} - \frac{v}{y})$ $\frac{5}{x} - \frac{v}{y} = -4 \xrightarrow{x-xy} vx - 5y = 4xy$
 $\Rightarrow \begin{cases} 3y - 3x = 4xy \\ vx - 5y = 4xy - 3x \end{cases} \Rightarrow 10x = 14y \rightarrow \frac{x}{y} = \frac{7}{5} = \frac{f}{a}$

$f = \{(a, 2a), (1, a+1), (1, -2), (2, b)\}$ $a + 1 = -2 \Rightarrow a = -3$

$f = \{(-3, -6), (1, -2), (2, b)\}$

$f(a) + 2f(2) = 3f(1) \Rightarrow -6 + 2b = -6 \Rightarrow 2b = 0 \Rightarrow b = 0$

$f = \{(-1, m^2 - 3m), (3, 5), (-1, -2), (m+1, 4), (2, 4), (m^2 + 2, f_{m+1})\}$

$m^2 - 3m = -2 \rightarrow m^2 - 3m + 2 = 0 \Rightarrow (m-1)(m-2) = 0 \Rightarrow m = 1, m = 2$

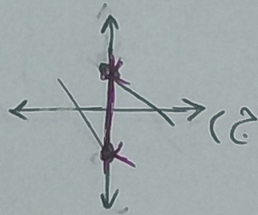
① $m = 1 \Rightarrow (m+1, 4) \rightarrow (2, 4) / (m^2 + 2, f_{m+1}) \rightarrow (3, 5) \checkmark$

② $m = 2 \Rightarrow (m+1, 4) \rightarrow (3, 4) \text{ غلط } \boxed{m=1}$

الف) تابع نسبت چون خط عمود را در دو جا قطع می کند



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ب) تابع هست

د) تابع هست

الف) $y = -\sqrt{x+1} \rightarrow \begin{cases} y_1 = -\sqrt{x+1} \\ y_2 = \sqrt{x+1} \end{cases} \Rightarrow y_1 = 1/2 \rightarrow \text{تابع هست}$

ب) $x = \frac{y}{\sqrt{1-y^2}} \xrightarrow{x=y^2} y = \frac{y}{\sqrt{1-y^2}} \Rightarrow x = \frac{y^2}{1-y^2} \Rightarrow x - xy^2 = y^2 \Rightarrow$

$x = 5y^2 \Rightarrow \frac{x}{5} = y^2 \Rightarrow y = \pm \frac{\sqrt{x}}{\sqrt{5}} \rightarrow \text{تابع نیست}$

الف) $|y| = x \xrightarrow{x=1} |y| = 1 \Rightarrow y = \pm 1 \rightarrow$ تابع نسیب

ب) $y^3 + 3y^2 + 3y + x^3 + x = 0 \rightarrow (y+1)^3 - 1 + x^3 + x = 0 \Rightarrow (y+1)^3 = 1 - x^3 - x \Rightarrow$

$y = \sqrt[3]{1-x^3-x} - 1$ $\begin{cases} y_1 = \sqrt[3]{1-x^3-x} - 1 \\ y_2 = \sqrt[3]{1-x^3-x} - 1 \end{cases} \Rightarrow y_1 = y_2 \rightarrow$ تابع هست

$f(x) = \frac{x^2 + 4x + a}{x^2 + 4x + 4} \rightarrow \frac{(\sqrt{3}-2)^2 + 4(\sqrt{3}-2) + a}{(\sqrt{3}-2)^2 + 4(\sqrt{3}-2) + 4} = \frac{9 - 4\sqrt{3} + 4 + 4\sqrt{3} - 8 + a}{9 - 4\sqrt{3} + 4 + 4\sqrt{3} - 8 + 4} =$

$\frac{1}{12} = \frac{a}{4}$

$f(-1) = -2 \Rightarrow (-1)^2 + a(-1) + b = -2 \Rightarrow b = -2 + a$

$f(x) = 3x - a \Rightarrow x^2 + ax + b = 3x - a \xrightarrow{b = -2 + a} x^2 + ax + (-2 + a) = 3x - a \Rightarrow$

$x^2 + ax - 3x - 2 + a + a = 0 \Rightarrow x^2 + (a-3)x + (2a-2) = 0 \xrightarrow{x=-1}$ ریشه اول

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

$b = -2 + a \rightarrow b = -2$ $x^2 + (a-3)x + (2a-2) = 0 \xrightarrow{a=1, b=-2} x^2 - 2x - 1 = 0 \div x+1$

$(x+1)(x^2 - x - 1) = 0 \rightarrow x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-1)}}{2(1)} \rightarrow x_1 = \frac{1+\sqrt{5}}{2}, x_2 = \frac{1-\sqrt{5}}{2} \rightarrow x_1 + x_2 = \frac{1+\sqrt{5}+1-\sqrt{5}}{2} = 1$

$f = \{(2, a+b), (1, 2a), (-1, a-2b+1)\}$ تابع ثابت است $\Rightarrow \begin{cases} a+b = 2a \Rightarrow b = a \\ a-2b+1 = 2a \Rightarrow \\ a-2a+1-2a = 0 \Rightarrow \\ -3a = -1 \Rightarrow a = \frac{1}{3} \end{cases}$

$\frac{4x^2 - ax + c + 1}{bx + 3} = x \xrightarrow{xbx+3} 4x^2 - ax + c + 1 = bx^2 + 3x$ ضرایب تمام توان های x باید برابر باشند

① $4-b = 0 \rightarrow b = 4$ ضریب x^2

② $-a-3 = 0 \rightarrow a = -3$ ضریب x

③ $c+1 = 0 \rightarrow c = -1$ ضرایب ثابت

$a+b+c = -3+4-1 = 0$