① الف) $(9, x+2y)$, $(3x-y, -4)$ ← $9 = 3x-y$ ×2 ← $18 = 6x-2y$ ، $x+2y = -4$ ← $-4 = x+2y$

$\frac{x}{y} = \frac{\frac{14}{7}}{-4} = \frac{-2}{3}$ ← $\frac{14}{7} = 2x$ ← $x = 7$ ← $y = -3$ ← جایگذاری

ب) $(-3, -1)$, $(\frac{1}{x} - \frac{1}{y}, \frac{5}{x} - \frac{7}{y})$

$\frac{1}{x} - \frac{1}{y} = -1$ ، $\frac{5}{x} - \frac{7}{y} = -4$ ← $\frac{-2}{y} = -2$ ← $y = 1$ ، $x = -\frac{1}{2}$

$\frac{-1}{-\frac{1}{2}} = 2$ ← $\frac{-1}{-1 \times 2} = \frac{1}{2}$ جواب

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

$f(a) + 2f(2) = 3f(1)$

$-6 + 2b = 3 \times -2$ ← $-6 + 2b = -6$ ← $2b = 0$ ← $b = 0$ جواب

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

$m^2 - 3m = -2$ ← $m^2 - 3m + 2 = 0$ ← $(m-1)(m-2) = 0$

$m \neq 1$ ← $\{(3,5)(-2,-1)(2,2)(-1,-2)\}$ ← تابع نیست

$m \neq 2$ ← $\{(3,5)(-2,-1)(2,2)(4,4)\}$ ← تابع است!

جواب: ۲ از اعضای مجموعه

④ الف) X ب) ✓ ج) X زیرا دهنه‌ها رو به پایین هستند.

د) ✓

⑤ الف) $y = -\sqrt{x+1}$ ← ✓ ✓ ✓ ← تابع است!

ب) $x = \frac{y}{\sqrt{1-y^2}}$ ← $x_1 = x_2$ ← $\frac{y_1}{\sqrt{1-y_1^2}} = \frac{y_2}{\sqrt{1-y_2^2}}$ ← $\frac{y_1^2}{1-y_1^2} = \frac{y_2^2}{1-y_2^2}$ ← $y_1^2 = y_2^2$ ← $y_1 = \pm y_2$

$y_1 = -y_2$ ← $x_1 = -x_2$ ← نقض شد

$y_1 = y_2$ ← $x_1 = x_2$ ← تابع است!

⑥ الف) $|y| = x$ ← $x = 2$ ← $y = \pm 2$ ← تابع نیست

$x_1 = x_2$ ، $y_1 = y_2$ ← $x^3 + x y^2 + 3y^2 + 3y + 1 = 0$

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

$(y_2 - y_1)\left[(y_1^2 + y_1 y_2 + y_2^2) + 3(y_1 + y_2)\right] = 0$ ← $y_1 = y_2$ ← تابع است!

⑦ $f(x) = \frac{x^2+4x+5}{x^2+4x+7}$ ← $f(\sqrt{3}-2) = ?$

$\frac{(x+2)^2+1}{(x+2)^2+3}$ ← $\frac{(\sqrt{3}-2+2)^2+1}{(\sqrt{3}-2+2)^2+3}$

$\frac{3+1}{3+3} = \frac{4}{6} = \frac{2}{3}$ جواب

Subject: فرناز صالحی

Year: Month: Date:

① $f(x) = x^3 + ax + b$ $\quad y - 3x + a = 0 \quad (-1, -4)$

$y = 3x - a \rightarrow -4 = -3 - a \rightarrow a = 1 \Rightarrow (-1)^3 + (-1) + b = -4 \rightarrow b = -2$

$\Rightarrow x^3 - x - 2 = 3x - 1 \rightarrow x^3 - 4x - 1 = 0 \Rightarrow x^3 - 2x - 1 = 0$

$x^3 - 2x - 1 \;|\; x + 1$ / $x^3 + x^2$ / $-x^2 - 2x - 1$ / $-x^2 - x$ / $-x - 1$

$\Leftarrow (x+1)(x^2 - x - 1)$

$-\frac{b}{a} = \frac{-1-1}{1} = +1$ ✓ ج

② $f = \{(2, a+b), (1, 2a), (-1, a-2b+1)\}$ → تابع ثابت → $a = ?$

دو ضابطه‌ای → تابع ثابت → $a + b = 2a = a - 2b + 1$

$a = b$ ↙ $a - 2a + 1 = 2a$

$-a + 1 = 2a \rightarrow 3a = 1 \rightarrow a = \frac{1}{3}$ ✓ ج

⑩ $f(x) = \frac{4x^2 - ax + c + 1}{bx + 3}$ → تابع همانی → $a + b + c = ?$

$f(0) = 0 \rightarrow \frac{c+1}{3} = 0 \rightarrow c + 1 = 0 \rightarrow c = -1$

$f(1) = 1 \rightarrow \frac{4 - a + c + 1}{b + 3} = 1 \rightarrow 4 - a + c + 1 = b + 3$

$5 - a + c = b + 3 \rightarrow 2 + c = a + b$

$a + b + c \rightarrow 2 + c + c \rightarrow 2 - 1 - 1 = 0$ ✓ ج