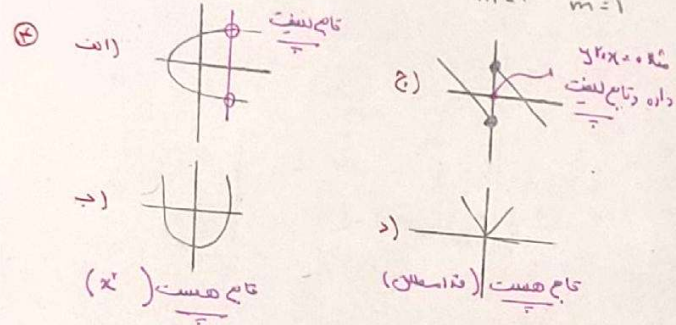


① $(3x - y = 9)^{x^2} \rightarrow \begin{cases} 4x - xy = 11 \\ x + 2y = -4 \end{cases}$
 $\sqrt{x} = 1^x \rightarrow \begin{cases} x = 1 \\ y = -3 \end{cases} \quad \frac{x}{y} = -\frac{1}{3}$

$\rightarrow \frac{1}{x} - \frac{1}{y} = -1 \rightarrow \begin{cases} (y-x = -xy) \cdot (-y) \\ \frac{y-x}{y} = -3 \rightarrow \frac{y-x-3xy}{y} = -\frac{1}{3} \end{cases}$
 $\frac{x}{y} = \frac{-\frac{1}{3}}{-\frac{1}{1}} = \frac{1}{3} \quad \boxed{y = -1}$

② $(a, 2a)(1, a+1)(1, -r)(r, b) \rightsquigarrow a+1 = -r \rightarrow a = -r$
 $f(a) + r f(r) = r f(a)$
 $ra + rb = ra + r \rightsquigarrow rb = a + r \rightarrow \boxed{b = 0}$

③ $(-1, m^2 - 3m)(r, d)(-1, 2)(m+1, 2)(r, f)(m^2 + r, km+1)$
 $m^2 - 3m = -2 \rightsquigarrow m^2 - 3m + 2 = 0 \rightarrow \frac{(m-1)(m-2)}{m=1 \quad m=2}$
 $m=1 \rightarrow (-1, -2)(r, d)(-1, -2)(r, 2)(r, f)$
 $m=2 \rightarrow (-1, -2)(r, d)(-1, -2)(r, 2)$



* بازاری هیچ از مقادیر m تابع نمی شود

⑤ الف) $y = -\sqrt{x+1}$ تابع هست
 $\rightarrow \frac{x-x_1}{\sqrt{1-y_1}} = \frac{y_1}{\sqrt{1-y_1}} \rightarrow \frac{y_1^2}{1-y_1^2} = \frac{y_1^2}{1-y_1^2}$
 $\frac{y_1^2 - y_1^2}{1-y_1^2} = \frac{y_1^2 - y_1^2}{1-y_1^2} \rightarrow y_1 = y_2$ تابع هست

⑥ الف) $x=2 \rightarrow |y|=2 \rightarrow y = \pm 2$ تابع نسبت
 ب) $x = x_1 \rightarrow x_1^2 + x_1 = x_2^2 + x_2 \rightarrow y_1^2 + 2y_1 + 2y_1 = y_2^2 + 2y_2 + 2y_2$
 $((y_1+1)^2 - 1) - ((y_2+1)^2 - 1) = 0$
 $(y_1 - y_2)(y_1 + y_2 + 2) + (y_1 + 1)(y_1 + 1) = 0$
 $y_1 = y_2 = -1 \quad y_1 = y_2 = -1$ تابع هست

⑦ $\frac{(\sqrt{x}-r)^2 + f(\sqrt{x}-r) + 4}{(\sqrt{x}-r)^2 + f(\sqrt{x}-r) + v} = \frac{r}{v} = \frac{2}{3}$

⑩ $f(x) = x$
 $\frac{fx^2 - ax + c + 1}{bx + r} = x$
 $fx^2 - ax + c + 1 = bx^2 + rx$
 $b = f \quad a = -r \quad c + 1 = 0 \rightarrow c = -1$
 $a + b + c = 0$

⑧ $y = rx - a \xrightarrow{(-1, -f)} -r - a = -f \rightarrow a = 1 \quad f(x) = x^2 + x + b \xrightarrow{(-1, -f)} -r + b = -f, b = -r$
 $x^2 - rx - 1 = 0 \rightarrow x(x^2 - 1) - (x+1) = 0 \rightarrow (x+1)(x^2 - x + 1) = 0 \rightarrow \boxed{xf = 1}$

⑨ $\frac{1}{x} \rightarrow y = k \rightarrow ra = a - ra + 1 \rightarrow ra = 1 \rightarrow a = \frac{1}{r} - b$
 $a + b = ra = a - rb + 1$
 $a + b = ra \rightarrow b = a$