

الف) $(9, x+2y), (3x-y, -4)$

سوال ۱

$$\left. \begin{aligned} 3x-y=9 &\rightarrow 3x-y=9 \\ x+2y=-4 &\rightarrow 3x+4y=-12 \end{aligned} \right\} \rightarrow 7y=-21 \rightarrow y=-3, x=2$$

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

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

$$\left. \begin{aligned} \frac{1}{x} - \frac{1}{y} = -1 &\xrightarrow{\times 5} \frac{5}{x} - \frac{5}{y} = -5 \\ \frac{5}{x} - \frac{7}{y} = -3 &\end{aligned} \right\} \rightarrow \frac{-2}{y} = 2 \rightarrow y = -1, x = \frac{1}{2}$$

$$\rightarrow \frac{x}{y} = \frac{\frac{1}{2}}{-1} = \frac{1}{2}$$

سوال ۲

$\{(a, 2a), (1, a+1), (1, -2), (2, b)\}$

$(1, a+1) = (1, -2) \rightarrow a = -3$

$\{(-3, -4), (1, -2), (2, b)\}$

$f(a) + 2f(2) = 3f(1) \rightarrow -4 + 2b = -4 \rightarrow b = 0$

سوال ۳

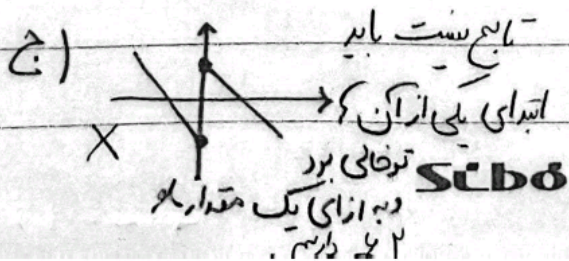
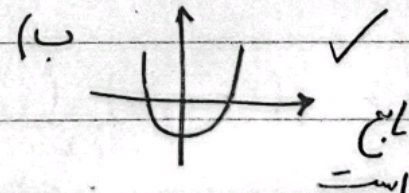
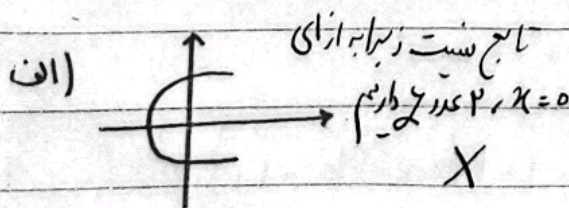
$\{(-1, m^2-3m), (3, 5), (-1, -2), (m+1, 6), (2, 4), (m^2+2, 8m+1)\}$

$m^2 - 3m = -2 \rightarrow m^2 - 3m + 2 = 0 \rightarrow (m-1)(m-2) = 0 \rightarrow m = 1 \text{ یا } 2$

اگر m برابر با ۲ باشد $m+1=3$ و جواب $(2, 6)$ می شود و ما $(2, 4)$ هم داریم، با به ازای

x یکسان y متفاوت نداریم و ۲ غیر قابل قبول است در رابطه $m^2 - 3m + 2 = 0$ پس m برابر با ۱ باشد (به ازای هیچ مقدار x نیست)

سوال ۴



سوال 5

الف) $y = -\sqrt{x+1} \rightarrow x+1 \geq 0 \rightarrow x \geq -1 \rightarrow [-1, +\infty)$
 تابع است ✓
 ابرصه به شکل

ب) $x = \frac{y}{\sqrt{1-y^2}}$ $x_1 = x_2$ $\left(\frac{y_1}{\sqrt{1-y_1^2}} = \frac{y_2}{\sqrt{1-y_2^2}}\right)^2 \rightarrow \frac{y_1^2}{1-y_1^2} = \frac{y_2^2}{1-y_2^2}$
 $y_1^2 = y_2^2 \Rightarrow \frac{1-y_1^2}{y_1^2} = \frac{1-y_2^2}{y_2^2} \Rightarrow \frac{1}{y_1^2} - 1 = \frac{1}{y_2^2} - 1$
 ملاحظه کنید که چون مخرجها مساوی است

الف) $|y| = x \rightarrow x = 2 \rightarrow y = \pm 2$ x سوال 6

ب) $y^3 + 3y^2 + 3y + x + x = 0$ $y_1^3 - y_2^3 + 3y_1^2 - 3y_2^2 + 3y_1 - 3y_2 + 2x = 0$ تابع ✓
 $(y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2) + 3(y_1 - y_2)(y_1 + y_2) + 3(y_1 - y_2) + 2x = 0$

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

$\rightarrow \frac{3 + 4\sqrt{3} - 4 + 4\sqrt{3} - 8 + 5}{3 + 4\sqrt{3} - 4 + 4\sqrt{3} - 8 + 7} = \frac{4}{4} = \frac{1}{1}$

$f(x) = x^3 + ax + b \rightarrow -1 - a + b = -\epsilon$ سوال 8

$-\epsilon + 2 + a = 0 \rightarrow a = 1$

$x^3 + x - 2 = 3x - 1 \rightarrow x^3 + x - 3x - 2 + 1 = 0 \rightarrow x^3 - 2x - 1 = 0$

$x^3 - 2x - 1 \mid x-1$
 $\frac{x^3 - x^2 - 2x - 1}{x^2 - x - 1}$
 $\frac{x^2 - x - 1}{x-1} \rightarrow x^2 - x - 1 = 0$ جمع کنیم
 $\frac{-b}{a} = \frac{-(-1)}{1} = +1$
 $x-1 \rightarrow x-1-x+1=0$

$$f = \left\{ (2, a+b), (1, 2a), (-1, a - 2b + 1) \right\}$$

سوال 9

$$a+b = 2a \rightarrow a = b \rightarrow a - b = 0$$

$$-b+1 = \frac{2a}{2b} \rightarrow 1 = 2b \rightarrow b = \frac{1}{2}, a = \frac{1}{2}$$

$$\frac{f x^2 - a x + c + 1}{b x + 2} = x \rightarrow \frac{f x^2 - a x + c + 1}{b x + 2} - x = 0$$

$$f x^2 - a x + c + 1 - b x^2 - 2x = 0$$

$$f x^2 = b x^2$$

$$b = f$$

$$-a x = 2x$$

$$a = -2$$

$$c = -1$$

$$f - 2 - 1 = 0$$