۱) الف) $(9, x+2y), (2x-y, -\varepsilon)$ $(9=3x-y)^{\times 2}$

$$\left.\begin{array}{l} 18=6x-2y \\ -\varepsilon = x+2y \end{array}\right\} \xrightarrow{+} 14=7x \to x=2 \quad \left.\begin{array}{l} x=2 \\ y=-3 \end{array}\right\} \frac{x}{y}=\frac{2}{-3}$$

ب) $(-1,-3), \left(\frac{1}{x}-\frac{1}{y}, \frac{5}{x}-\frac{7}{y}\right)$ $\left(-1=\frac{1}{x}-\frac{1}{y}\right)^{\times 7}$

$$\left.\begin{array}{l} -7=\frac{7}{x}-\frac{7}{y} \\ -3=\frac{5}{x}-\frac{7}{y} \end{array}\right\} \xrightarrow{-} -\varepsilon=\frac{2}{x} \to x=-\frac{1}{2} \quad \left.\begin{array}{l} x=-\frac{1}{2} \\ y=-1 \end{array}\right\} \frac{x}{y}=\frac{1}{2}$$

۲) $f=\{(a^{-3}, 2a^{-4}), (1, \frac{a+1}{2}^{-2}), (1, \frac{-2}{2}), (2,b)\}$

$$\left.\begin{array}{l} f(a)+2f(2)=3f(1) \longrightarrow 2a+2b=3a+3 \longrightarrow a=2b-3 \\ a+1=-2 \longrightarrow a=-3 \end{array}\right\} \boxed{b=0}$$

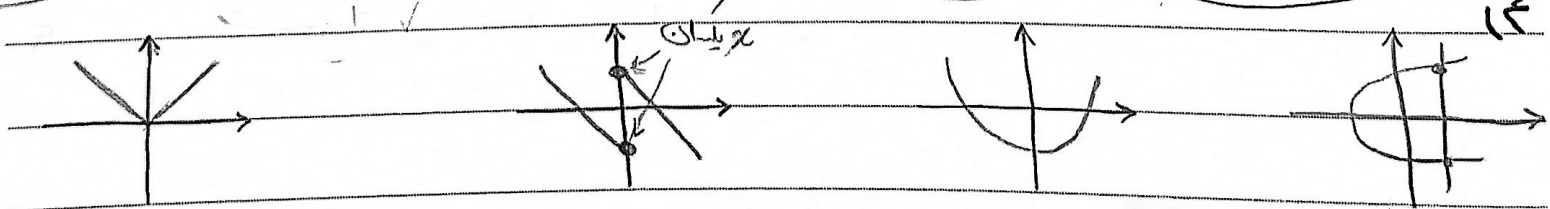
۳) $f=\left\{\left(\frac{-1}{2}, m^2-3m\right), (3,5), \left(\frac{-1}{2}, -2\right), (m+1, 6), (2,\varepsilon), (m^2+2, \varepsilon m+1)\right\}$

$-2=m^2-3m$

- $m=-1 \longrightarrow f=\{(-1,-2), (3,5), (0,6), (2,\varepsilon), (3,-3)\}$ ✗
- $m=2 \longrightarrow f=\{(-1,-2), (3,5), (3,6), (2,\varepsilon), (6,9)\}$ ✗

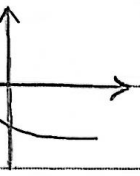
به ازای هیچ مقدار m

۴)



✓ تابع هست — ✗ تابع نیست — ✓ تابع هست — ✗ تابع نیست

۵) الف) $y=-\sqrt{x+1}$



✓ تابع است

ب) $x=\frac{y}{\sqrt{1-y^2}} \longrightarrow \begin{cases} x=\frac{y_1}{\sqrt{1-y_1^2}} \\ x=\frac{y_2}{\sqrt{1-y_2^2}} \end{cases} \longrightarrow \frac{y_1}{\sqrt{1-y_1^2}}=\frac{y_2}{\sqrt{1-y_1^2}} \longrightarrow y_1=y_2$

X تابع نیست

۶) الف) $|y|=x \longrightarrow \begin{cases} |y_1|=x \\ |y_2|=x \end{cases} \longrightarrow |y_1|=|y_2| \longrightarrow y_1=\pm y_1 \rightarrow y_1=y_2$ یا $y_1=-y_2$

X تابع نیست

ب) $y^3+3y^2+3y+x^3+x=0 \longrightarrow \begin{cases} y_1^3+3y_1^2+3y_1=-x^3-x \\ y_2^3+3y_2^2+3y_2=-x^3-x \end{cases}$

۷) $f(x)=\frac{x^2+6x+5}{x^2+6x+7} \rightsquigarrow f(\sqrt{3}-2)=\frac{3+6-6\sqrt{3}+6\sqrt{3}-8+5}{3+6-6\sqrt{3}+6\sqrt{3}-8+7}=\frac{6}{4}=\boxed{\frac{3}{2}}$

۹) $f=\{(2,a+b),(1,2a),(-1,a-2b+1)\}$ تابع ثابت $\longrightarrow f(x)=k$ عددی حقیقی

$a+b=2a \longrightarrow a=b$

$2a=a-2b+1 \xrightarrow{a=b} 2a=-a+1 \longrightarrow 3a=1 \longrightarrow a=\boxed{\frac{1}{3}}$

۱۰) $f(x)=\frac{6x^2-ax+c+1}{bx+2}$ تابع همانی $\longrightarrow f(x)=x$

$6x^2-ax+c+1=bx^2+2x \longrightarrow \begin{cases} b=6 \\ a=-2 \\ c=-1 \end{cases}$ $\quad a+b+c=0$