۱- الف) $y=x^2-5 \Rightarrow y+5=x^2 \rightarrow x=\pm\sqrt{y+5}$ $\Rightarrow y+5\geq 0 \rightarrow y\geq -5 \Rightarrow R_f=[-5,\infty)$

ب) $y=x^3+1 \Rightarrow x^3=y-1 \Rightarrow x=\sqrt[3]{y-1} \Rightarrow R_f=R$

۲- الف) $y=x^2-4x+6 \Rightarrow y-x^2+4x-6=0 \Rightarrow x=\frac{-b\pm\sqrt{\Delta}}{2a} \Rightarrow \Delta\geq 0 \Rightarrow 16-4(6-y)\geq 0$

$\Rightarrow y\geq 2 \Rightarrow R_f=[2,+\infty)$ روش دوم $\rightarrow y=(x-2)^2+2 \rightarrow x-2=\pm\sqrt{y-2} \rightarrow x=\pm\sqrt{y-2}+2$

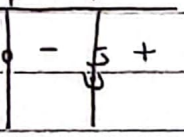
$y\geq 2 \rightarrow R_f=[2,+\infty)$

ب) $y=x^2-5x+1 \Rightarrow y-x^2+5x-1=0 \Rightarrow y=(x-\frac{5}{2})^2-\frac{21}{4} \rightarrow x=\pm\sqrt{y+\frac{21}{4}}+\frac{5}{2}$

$y\geq -\frac{21}{4} \rightarrow R_f=[\frac{-21}{4},+\infty)$

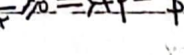
۳- الف) $y=\frac{x^2-3}{x^2-2} \Rightarrow yx^2-2y=x^2+3 \Rightarrow x^2(y-1)=2y+3 \Rightarrow x=\pm\sqrt{\frac{2y+3}{y-1}}$

$\Rightarrow \frac{2y+3}{y-1}\geq 0 \Rightarrow$ نقاط بحرانی: $2y+3=0 \rightarrow y=-\frac{3}{2}$ ، $y-1=0 \rightarrow y=1$



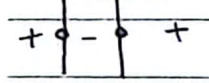
$\Rightarrow R_f=(-\infty,-\frac{3}{2}]\cup(1,+\infty)$

ب) $y=\frac{2|x|+1}{|x|-4} \Rightarrow y|x|-4y=2|x|+1 \Rightarrow |x|(y-2)=4y+1 \Rightarrow |x|=\frac{4y+1}{y-2} \Rightarrow \frac{4y+1}{y-2}\geq 0$



$\Rightarrow R_f=(-\infty,-\frac{1}{4}]\cup(2,+\infty)$

۴- $y=\frac{1}{x^2-4x} \Rightarrow yx^2-4yx-1=0 \Rightarrow x=\frac{4y\pm\sqrt{16y^2+4y}}{2y} \Rightarrow \begin{cases} 2y\neq 0 \rightarrow y\neq 0 \\ 16y^2+4y\geq 0 \Rightarrow 4y(4y+1) \end{cases}$



$\Rightarrow R_f=(-\infty,-\frac{1}{4}]\cup(0,+\infty)$

۵- الف) $y=x^2-4x+2 \overset{a>0}{\Rightarrow} \begin{cases} \frac{-b}{2a}=\frac{4}{2}=2 \\ 4-8+2=-2 \end{cases} \Rightarrow R_f=[-2,+\infty)$

ب) $y=-x^2+4x+2 \overset{a<0}{\Rightarrow} \begin{cases} \frac{-b}{2a}=\frac{-4}{-2}=2 \\ -4+8+2=6 \end{cases} \Rightarrow R_f=(-\infty,6]$

۶- الف) $y=\sqrt{x^2-4x+2}$ ax.

$\frac{-b}{2a}=\frac{4}{2}=2$

$9-18+2=-7$

$\Rightarrow R_f=\sqrt{[-7,+\infty)}=[0,+\infty)$

ب) $y=\sqrt{-x^2+14x+10}$ ax.

$\frac{-14}{-2}=7$

$-49+98+10=14$

$\Rightarrow R_f=\sqrt{(-\infty,14]}=[0,\sqrt{14}]$

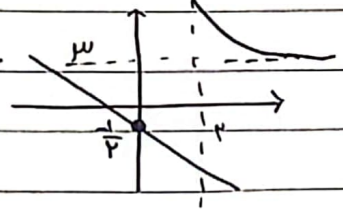
۷- الف) $y=x^7+3x^4+2x+1 \Rightarrow R_f=R$

ب) $y=\sqrt{x^4+4x^3+4x+1} \Rightarrow R_f=[0,+\infty)$

۸- الف) $y=\frac{3x+1}{x-2} \Rightarrow R-\{\frac{c}{a}\} \Rightarrow R-\{3\}$

ب) $y=\sqrt{\frac{4x+1}{x+3}} \Rightarrow R_f=\sqrt{R-\{4\}}=[0,+\infty)-\{2\}$

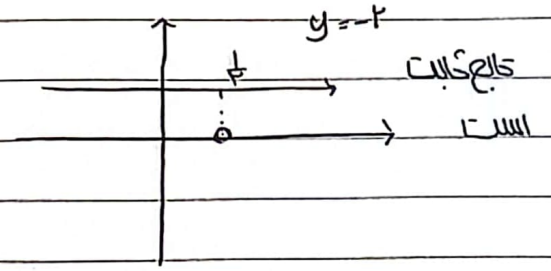
۹- الف) $y=\frac{3x+1}{x-2}$



$x=0$

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

ب) $y=\frac{4x-2}{1-2x} \rightarrow \frac{2(2x-1)}{1-2x}=-2$



۱۰-

الف) $y=\cos^2 x+\frac{1}{\cos^2 x} \Rightarrow R_f=[2,+\infty)$

ب) $y=\sqrt[3]{\frac{x^2+1}{x}}=\sqrt[3]{x+\frac{1}{x}}=\sqrt[3]{(-\infty,-2]\cup[2,+\infty)} \Rightarrow R_f=(-\infty,\sqrt[3]{-2}]\cup[\sqrt[3]{2},+\infty)$