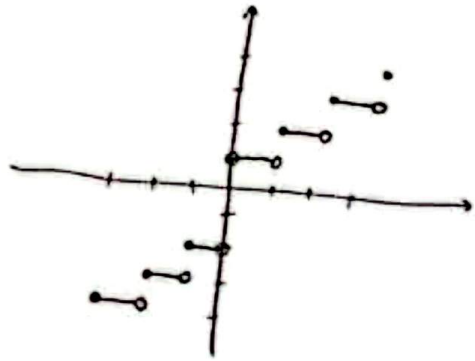
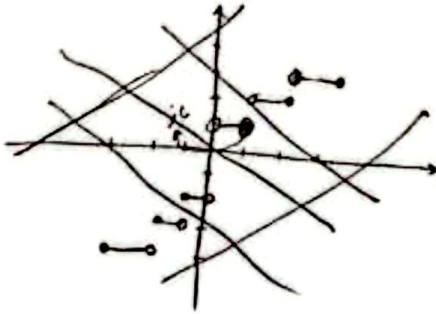


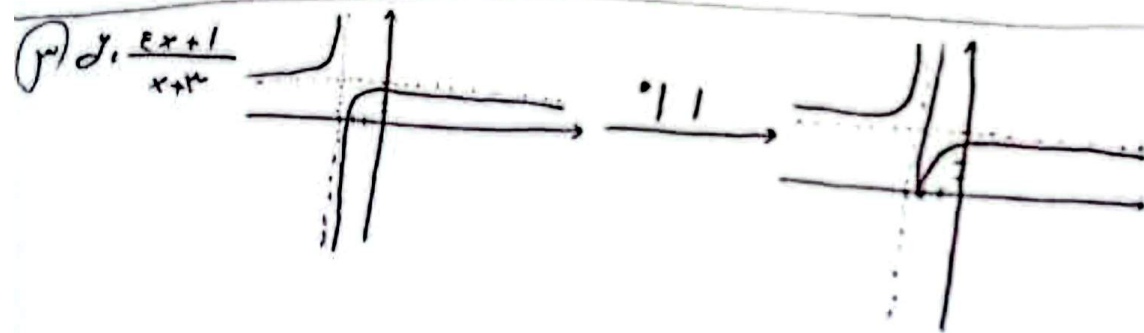
①  $y = r \sin^2(x + \frac{\pi}{4}) - 1 \rightarrow \sin^2(x + \frac{\pi}{4}) \leq 1 \rightarrow 0 \leq r \sin^2(x + \frac{\pi}{4}) \leq r$   
 $R_y = [-1, 1] \rightarrow -1 \leq r \sin^2(x + \frac{\pi}{4}) - 1 \leq 1$

$\Rightarrow y(x) = r \cos^2 x - 1 \rightarrow -1 \leq \cos^2 x \leq 1 \rightarrow -r \leq r \cos^2 x \leq r \rightarrow -r \leq r \cos^2 x - 1 \leq r - 1 \rightarrow R_{y(x)} = [-r, r-1]$

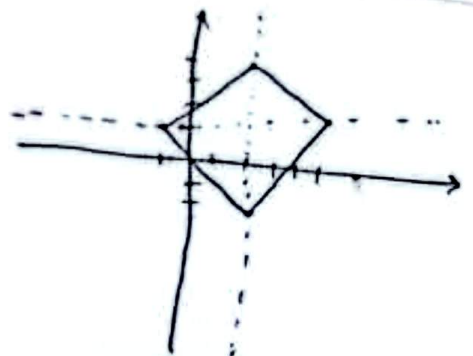
②  $[-2, -2] \rightarrow -2$   
 $[-2, -1] \rightarrow -2$   
 $[-1, 0] \rightarrow -1$   
 $[0, 1] \rightarrow 1$   
 $[1, 2] \rightarrow 2$   
 $[2, 3] \rightarrow 3$   
 $3 \rightarrow 3$



Graph of the function



④  $\begin{cases} x > 2 \\ y > 1 \end{cases} \rightarrow y = -x + 4$   
 $\begin{cases} x < 2 \\ y > 1 \end{cases} \rightarrow y = x + 2 - 1 = x + 1 \rightarrow y = x + 1$   
 $\begin{cases} x < 2 \\ y < 1 \end{cases} \rightarrow y = 2 - x + 1 - y = 3 - x - y \rightarrow y = 3 - x$   
 $\begin{cases} x > 2 \\ y < 1 \end{cases} \rightarrow y = x - 2 + 1 - y = x - 1 - y \rightarrow y = x - 1$



⑤  $y = (\sin x)(1 + \sin x) = \sin x + \sin^2 x \rightarrow \sin x \in [-1, 1] \rightarrow R_y = [0, 1]$

(9)  $\left\{ \begin{array}{l} 1 \rightarrow \frac{r^2}{2} \\ r \rightarrow \frac{r^2}{2} \\ r \rightarrow \frac{r^2}{2} \\ r \rightarrow \frac{r^2}{2} \\ r \rightarrow \frac{r^2}{2} \\ r \rightarrow \frac{r^2}{2} \\ r \rightarrow \frac{r^2}{2} \\ r \rightarrow \frac{r^2}{2} \\ r \rightarrow \frac{r^2}{2} \\ r \rightarrow \frac{r^2}{2} \end{array} \right\} y \rightarrow \frac{r^2}{2} + \frac{r^2}{2} + \frac{r^2}{2} + \frac{r^2}{2} + \frac{r^2}{2} + \frac{r^2}{2} + \frac{r^2}{2} + \frac{r^2}{2} + \frac{r^2}{2} + \frac{r^2}{2} = \frac{r^2}{2} \cdot 10$

(10)  $a < 0 \rightarrow \sqrt{bx+c}$   $\rightarrow \frac{rb+c}{rb+c+1}$   $b > 1 \rightarrow c < 1 \rightarrow g(x) = \sqrt{x^2 + \epsilon}$   $\rightarrow x_2 = -1$   $y_2 = 1$   $R_{g(x)} = [1, +\infty)$

(11)  $f(x) = \frac{x(x+1)(x-1)}{(x+1)} = x^2 - 1$   $f\left(\frac{a+\epsilon}{r}\right) = \frac{-r+\epsilon}{-r} > -1$   $\rightarrow f(-1) = 1$   $C < 1$   $x^2 - 1 < 1 \rightarrow x^2 - 1 < 1 \rightarrow (x+1)(x-1) < 0$   $\rightarrow x < -1$   $\rightarrow x > 1$   $a = -1$   $b = \epsilon$

(12)  $\sqrt{x^2 + ax + b} - 1 = \sqrt{(x-1)^2} \rightarrow (x-1)^2 = x^2 - 2x + 1 = 1 \rightarrow x = 0$   $\rightarrow a = -2$   $b = 1$   $[a, b] = [-2, 1]$   $R_g = [-1, 1]$

