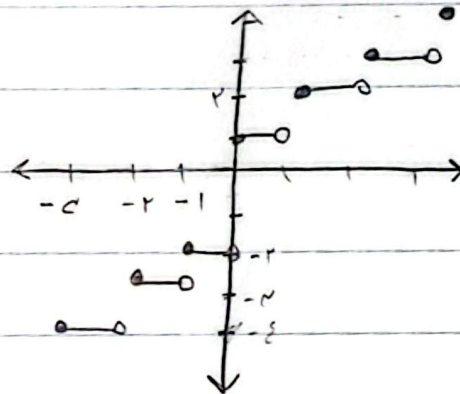


الف) $\sqrt{2} \sin^2 \left(\frac{\pi}{4} + \frac{\pi}{4} \right) - 1 \rightarrow 0 < \sin^2(\alpha) < 1 \rightarrow 0 < \sqrt{2} \sin^2(\alpha) < \sqrt{2}$ (سوال ۱)
 $-1 < \sqrt{2} \sin^2 \alpha - 1 < 1 \rightarrow R_f = [-1, 1]$

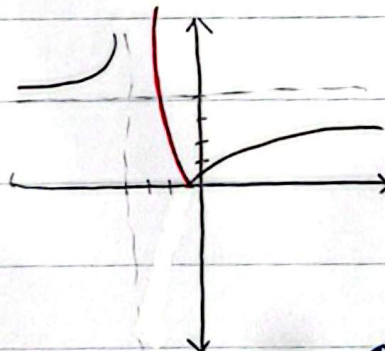
ب) $\sqrt{2} \cos^2 \pi - \varepsilon \rightarrow -1 < \cos^2 \pi < 1 \rightarrow -\sqrt{2} < \sqrt{2} \cos^2 \pi < \sqrt{2}$
 $R_f = [-\sqrt{2}, \sqrt{2}]$

$y = \frac{\pi}{|x|} + [x]$



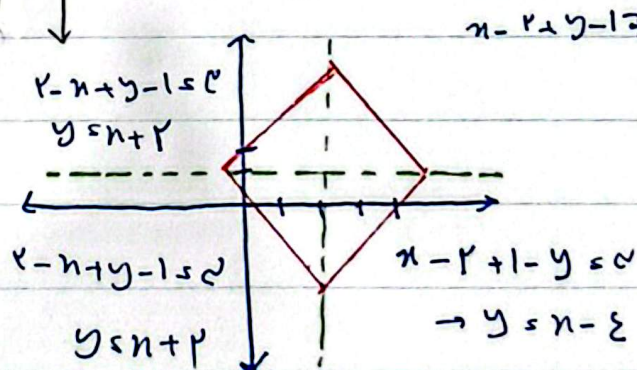
(سوال ۲)

$y = \left| \frac{\varepsilon x + 1}{x + 2} \right|$



(سوال ۳)

$|x-2| + |y-1| = 2$



(سوال ۴)

الف) $f(x) \leq x + \frac{1}{x} \rightarrow \sqrt{x + \frac{1}{x}} = \left(\sqrt{x + \frac{1}{x}} \right)^2 + \sqrt{x + \frac{1}{x}}$ (سوال ۵)

$\sqrt{x + \frac{1}{x}} \rightarrow +\infty$
 $\frac{-b}{2a} = -1 \rightarrow \dots$ (سوال ۶)

$$b) y = (\sqrt{z} - \sinh z)(1 + \sinh z) = -\sinh^2 z + \sqrt{z} \sinh z + \sqrt{z}$$

$$\sinh z \begin{matrix} \nearrow 0 \\ \rightarrow \varepsilon \\ \searrow \varepsilon \end{matrix} \Rightarrow R_f = [0, \varepsilon]$$

$$f(z) = \frac{1}{z} z + 10 \rightarrow \frac{r_9}{z} + \frac{r_8}{z} + \frac{r_7}{z} + \dots + \frac{r_1}{z} = \frac{(r_1 + r_9) \times 9}{z} \quad \text{سوال ٦}$$

$$= \sqrt{z}$$

سوال ٧) طبق جدول مقیاس علامت تابع درجه ١ است و $a \leq 0$ و r_2 نیز آن.

$$\frac{r}{-p+} \rightarrow \begin{cases} (rb+d=0) \\ (cb+e=1) \\ b=1, c=-r \end{cases} \Rightarrow g(z) = \sqrt{z^2 + \varepsilon}$$

$\hookrightarrow \min \Big|_0^\varepsilon$

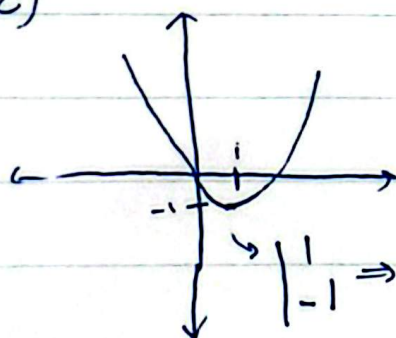
$$R_g = \sqrt{[\varepsilon, +\infty)} \subseteq [r, +\infty)$$

سوال ٨)

$$f(z) = \frac{z^2 - \varepsilon z}{z+r} = \frac{z(z+r)(z-r)}{z+r} \xrightarrow{z \neq -r} z^2 - rz = 1 \rightarrow (z-r)(z+r) = 0$$

$$\Rightarrow z = \varepsilon, z = -r$$

$$\{a, b\} = \{-r, \varepsilon\}$$



$$f\left(-\frac{r+\varepsilon}{-r}\right) = f(-1) = 1$$

$$\Rightarrow c=1$$

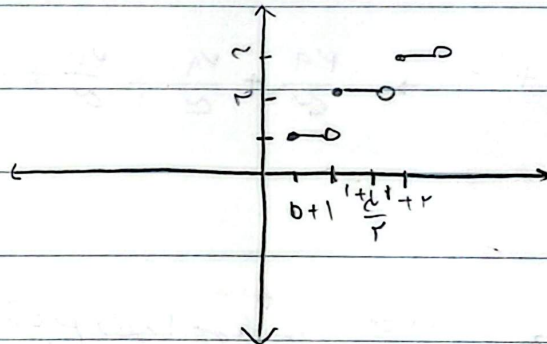
$$y = \sqrt[n^p + an^r + bn - 1]{\frac{a}{b} \cdot \frac{1}{c} \cdot \frac{1}{d}} \sqrt[n-r]{c}$$

(9 د.ب)

$$\sqrt[n^2 - 4n^r + 12n - 1]{} \rightarrow a = -4, b = 12 \quad -4 < n < 12$$

$$-1 < n-r < 10 \rightarrow R_f \in [-1, 10]$$

$$y = [n] + [n + \frac{1}{r}]$$



(1. د.ب)