

سوال ۱) الف) $\frac{(x-1)^2 - x^2}{x(x-1)} \gg 0 \rightarrow \frac{x^2 - 2x + 1 - x^2}{x(x-1)} \gg 0 \rightarrow \frac{-2x + 1}{x(x-1)} \gg 0$ + $\frac{1}{x} - \frac{1}{x-1}$ $D_f = (-\infty, 0) \cup [\frac{1}{2}, 1)$

ب) $\{x \neq 0 \rightarrow x \neq -1, 0, 1, -2$ $\frac{x^2 + 4x + 1}{(x-1)(x+2)} \neq 0 \rightarrow x \neq -\frac{1}{4}$ $D_f = \mathbb{R} - \{-2, -\frac{1}{4}, -1, 0, 1\}$

سوال ۲) الف) $((\frac{1}{x})^2 - 9)(x^2 - 4) \geq 0$ + $\frac{-2}{x} - \frac{2}{x-2}$ $D_f = (-\infty, -2] \cup [2, +\infty)$

ب) ① $x-1 \geq 0$ ② $\sqrt{x+1} + \sqrt{x-1} = 2 \rightarrow x - \sqrt{x-1} \geq 0$ ③ $\sqrt{x-1} \leq 1 \rightarrow x \leq 2$ $D_f = [1, 2]$

سوال ۳) ① $x^2 - x - 2 > 0$ $\begin{cases} x = -1 \\ x = 2 \end{cases}$ + $\frac{-1}{x} - \frac{1}{x-2}$ $D_f = (-\infty, -1) \cup (2, +\infty)$

② $x^2 - 1 \geq 0$ + $\frac{-1}{x} - \frac{1}{x-1}$

سوال ۴) $D_f = [-2, b] \rightarrow f(x) = 0 \rightarrow -(x)^2 + a(x) + 3 = 0$ $-2a = 1 \rightarrow a = -\frac{1}{2}$

$f(x) = \sqrt{-x^2 - \frac{1}{2}x + 3} \rightarrow -x^2 - \frac{1}{2}x + 3 \geq 0$ $x_{1,2} = \frac{-(-\frac{1}{2}) \pm \sqrt{(-\frac{1}{2})^2 - 4(-1)(3)}}{2(-1)} = \left\{ \begin{matrix} -2 \\ \frac{3}{2} \end{matrix} \right.$ + $\frac{-x}{x} + \frac{3}{x-1}$

$D_f = [-2, \frac{3}{2}] \rightarrow b = \frac{3}{2}$ $a + b = -\frac{1}{2} + \frac{3}{2} = 1$

سوال ۵) $f(x) - x \geq 0$ ① $x > 1$ $\begin{cases} x^2 - 2x - x \geq 0 \\ x(x-1) \geq 0 \end{cases} \rightarrow x-1 \geq 0 \rightarrow x \geq 1$ ✓ ② $x < 1$ $\begin{cases} x^2 + 3 - x \geq 0 \\ x+3 \geq 0 \end{cases} \rightarrow x \geq -3 \rightarrow [-3, 1)$ + $\frac{1}{x} - \frac{1}{x-1}$ $D_f = [-3, +\infty)$

سوال ۶) $\sin \frac{\pi}{4} + \cos 2\pi = \frac{\sqrt{2}}{2} + 1$ $f(x) = 2x(x-2) \rightarrow f(\frac{\sqrt{2}}{2} + 1) = 2(\frac{\sqrt{2}}{2} + 1)(\frac{\sqrt{2}}{2} - 1) = -1$ $2(\frac{\sqrt{2}}{2} - 1) = -\frac{\sqrt{2}}{2} = -\frac{1}{\sqrt{2}}$

سوال ۷) $f(\frac{a+1}{a-1}) = a \rightarrow \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{\frac{a+1+a-1}{a-1}}{\frac{a+1-a+1}{a-1}} = \frac{2a}{2} = a$ $a = a$ $\mathbb{R} - \{1\}$ ب) ایا عددی متغیر: $\frac{1}{2}$ جز ۱

$$f(\sqrt{a^2-1}) = -r \rightarrow a^2-1 - r\sqrt{a^2-1} = -r \quad (a^2-1) - r\sqrt{a^2-1} + r = 0 \quad (1 \text{ حل})$$

$$(\sqrt{a^2-1} - r)^2 = 0 \rightarrow \sqrt{a^2-1} = r$$

$$a^2-1 = r^2 \rightarrow a = \pm\sqrt{r^2+1}$$

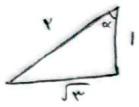
$$x+r = r \xrightarrow{x=1} f(r) = 1^2 - \omega(1) + r = r \quad f(r) \times f(-r) = r \times (-r) = -r^2$$

$$x+r = -r \xrightarrow{x=-r} f(-r) = (-r)^2 - \omega(-r) + r = r^2 + r$$

$$r \cos x + \omega \sin x = r/\omega$$

$$r \cos x + \omega \sin x - r/\omega = 0 \rightarrow (r \cos x + r/\omega)(r \cos x - 1) = 0$$

$$\begin{cases} \cos x = \frac{-r/\omega}{r} = -\frac{r}{\omega} < -1 \text{ لا يوجد} \\ \cos x = \frac{1}{r} \checkmark \end{cases} \quad (1 \text{ حل})$$



$$\rightarrow \cos \alpha = \frac{1}{r}$$

$$\tan^2 x = (\sqrt{r})^2 = r \rightarrow f(r, \omega) = r$$