

الف) $\frac{x-1}{x} - \frac{x}{x-1} = \frac{x^2 + 1 - 2x}{x^2 - x} = \frac{1-2x}{x^2-x} \geq 0 \rightarrow \frac{1-2x}{x(x-1)} \geq 0$

گراف: $\frac{1-2x}{x(x-1)} \geq 0$ → $(-\infty, 0) \cup [\frac{1}{2}, 1)$

ب) $\frac{1}{x+1} - \frac{2}{x} = \frac{-2-x}{x^2+x} \rightarrow x \neq -1, 0$

$\frac{1}{x-1} + \frac{1}{x+2} = \frac{x^2+x-1}{x^2+x-2} \neq 0 \rightarrow x \neq -\frac{5}{2}, -1, 1$

$D_f = \mathbb{R} - \{-\frac{5}{2}, -1, 1\}$

الف) $(\frac{1}{x})^x - 9 \geq 0 \rightarrow (\frac{1}{x})^x = 9 \rightarrow x = 2$

$2^2 = 4 \rightarrow 2 = 2^2 \rightarrow x = \frac{5}{2}$

گراف: $\frac{1}{x} - 9 \geq 0$ → $D_f = (-\infty, -2] \cup [\frac{5}{2}, +\infty)$

ب) $\sqrt{x+1} = 3 - \sqrt{x-1} \rightarrow 3 \geq \sqrt{x-1} \rightarrow 9 \geq x-1 \rightarrow 10 \geq x$

$D = [1, 10]$

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

گراف: $\frac{x^2-x-2}{(x-2)(x+1)} \geq 0$ → $D_f = (-\infty, -1) \cup (2, +\infty)$

$x^2-1 \geq 0 \rightarrow x^2 \geq 1 \rightarrow x \geq 1$
 $x \leq -1$

$D_f = (-\infty, -1) \cup (2, +\infty)$

$-x^2 + ax + 3 \geq 0 \rightarrow -x^2 + ax + 3 = 0 \rightarrow +2a + 1 = 0 \rightarrow a = -\frac{1}{2}$

$x = b \rightarrow -b^2 - \frac{1}{2}b = -3 \rightarrow b^2 + \frac{1}{2}b = 3 \rightarrow b(b + \frac{1}{2}) = 3$

$a + b = 1, 5 - 0/5 = 1$

بازه‌های تابع را خارج می‌کنند.

$\sqrt{f(x)} - x \rightarrow f(x) \geq x \rightarrow 3x - 2 = x \rightarrow 2x - 2 = 0 \rightarrow x = 1$

$2x + 3 = x \rightarrow x + 3 = 0 \rightarrow x = -3$

گراف: $\sqrt{f(x)} - x \geq 0$ → $D_f = [-3, +\infty)$

$f(a) = (a+1)(v) \rightarrow va + v, f(-2) = 3a - 4 \rightarrow 14a + 12 = 3a - 4 \rightarrow 10a = -16$

$a = -1, 8$

$f(2-\sqrt{2}) \Rightarrow \sqrt{2-\sqrt{2}} = \frac{\sqrt{4-\sqrt{4}}}{2} = \frac{\sqrt{4-\sqrt{4}}}{2}$

$\sqrt{x} + \frac{1}{\sqrt{x}} \Rightarrow \frac{\sqrt{4-\sqrt{4}}}{2} + \frac{2}{\sqrt{4-\sqrt{4}}} = \sqrt{4} \rightarrow f(2-\sqrt{2}) = \sqrt{4} + 2$

$f(2+\sqrt{2}) = \sqrt{4} + 2$

گراف: $\sqrt{x} + \frac{1}{\sqrt{x}} \geq 2$ → $D_f = [1, +\infty)$

$f(x) = f(1) \rightarrow 2x^2 f(1) - 2f(-1) = 3 \rightarrow 4f(1) - 2f(-1) = 3$

$3x^2 f(-1) - 2f(1) = 5 \rightarrow 6f(-1) - 2f(1) = 5$

$f(1) = \frac{21}{-5} \rightarrow f(x) = -\frac{21}{5}$

$f(0) \Rightarrow 2f(0) = 3m-1 \rightarrow f(0) = \frac{3m-1}{2}$ (o/a) -9
 $f(-1) \Rightarrow 2f(0) = 14 + 2m + \cancel{3m-1} \rightarrow 2f(0) = 14 + 2m$ 14 + 2m $\rightarrow m = \frac{9}{2}$
 $f(0) = \frac{3(\frac{19}{2})-1}{2} = \frac{25}{2}$ $\frac{19}{2} = m \leftarrow 2m = 19$
 $f(0) = \frac{25}{2}$ $f(0) = \frac{25}{2}$

$f(-1) + f(-1) = \frac{14 + 14 + 3m-1}{-1} \Rightarrow 2f(-1) = -18 \rightarrow f(-1) = -9$ (2) -10