

الف) $f(x) = \sqrt{\frac{x-1}{x} - \frac{x}{x-1}} \Rightarrow \frac{x-1}{x} - \frac{x}{x-1} \geq 0 \Rightarrow \frac{(x-1)^2 - x^2}{x(x-1)} \geq 0$

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

0	1/2	1
+	-	+

$D_f = (-\infty, 0) \cup [\frac{1}{2}, 1)$

ب) $f(x) = \frac{\frac{1}{x+1} - \frac{x}{x-1}}{\frac{x}{x-1} + \frac{1}{x+2}} \sim x \neq 0, x \neq -1, x \neq 1, x \neq -2$

$\frac{x}{x-1} + \frac{1}{x+2} \neq 0 \Rightarrow \frac{3x+4+x-1}{(x-1)(x+2)} \neq 0$

$\Rightarrow \frac{4x+3}{(x-1)(x+2)} \neq 0 \sim x \neq -\frac{3}{4}$

$D_f = \mathbb{R} - \{0, -1, 1, -2, -\frac{3}{4}\}$

① ② $\rightarrow D_f = (-2, -\frac{3}{4}) \cup (1, +\infty)$

الف) $f(x) = \sqrt{((\frac{1}{x})^x - 9)(32 - 4^x)} \Rightarrow ((\frac{1}{x})^x - 9)(32 - 4^x) \geq 0$

	-2	5/2
$((\frac{1}{x})^x - 9)$	+	-
$(32 - 4^x)$	+	-
$((\frac{1}{x})^x - 9)(32 - 4^x)$	+	-

$D_f = (-\infty, -2] \cup [\frac{5}{2}, +\infty)$

ب) عبارت جذبی را دنبال می‌کنیم

$\sqrt{x-1} + \sqrt{y-1} = 3 \Rightarrow \sqrt{y-1} = 3 - \sqrt{x-1} \rightarrow$

$3 - \sqrt{x-1} \geq 0 \Rightarrow \sqrt{x-1} \leq 3 \Rightarrow x-1 \leq 9 \Rightarrow x \leq 10$

$f(x) = \frac{\log_e(x^2 - x - 2)}{\sqrt{x^2 - 1} + 1} \sim x^2 - x - 2 \geq 0 \Rightarrow (x-2)(x+1) \geq 0$

-1	2
+	-

① $(-\infty, -1) \cup (2, +\infty)$

$x^2 - 1 \geq 0 \Rightarrow x \geq 1$

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

$f(x) = \sqrt{4 + ax - x^2} \sim -x^2 + ax + 4 \geq 0$

$a + b = 1$

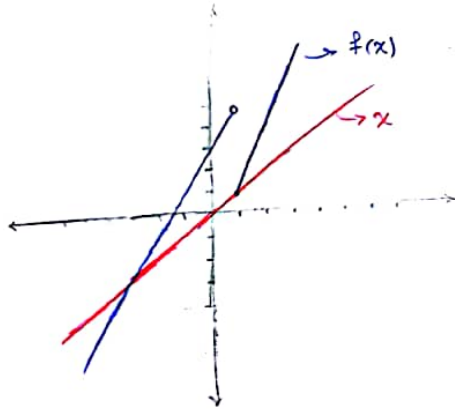
$x = -2 \Rightarrow -4 - 2a + 4 = 0 \Rightarrow -2a = 0 \Rightarrow a = 0$

$-x^2 - \frac{1}{2}x + 4 = 0 \Rightarrow x = \frac{-\frac{1}{2} \pm \sqrt{\frac{1}{4} + 16}}{-2} \Rightarrow x_1 = -2, x_2 = \frac{7}{2} \sim b = \frac{7}{2}$

$$g(x) = \sqrt{f(x) - x} \leadsto f(x) - x \geq 0 \Rightarrow f(x) \geq x$$

$$rx + r = x \Rightarrow x = -r$$

$$Df = [-r, +\infty)$$



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$$f(a) = (a+1)(a+r) = v(a+1) = va + v$$

$$rf(a) = f(-r) + a \Rightarrow rx(va + v) = f(-r) + a \Rightarrow 1 \varepsilon a + 1 \varepsilon = f(-r) + a$$

$$\Rightarrow f(-r) = 1 \varepsilon a + 1 \varepsilon \quad f(-r) = va - \varepsilon \Rightarrow 1 \varepsilon a + 1 \varepsilon = va - \varepsilon$$

$$\Rightarrow 1 \varepsilon a = -1 \varepsilon \quad a = -1, 1$$

$$\frac{1}{r - \sqrt{r}} \times \frac{r + \sqrt{r}}{r + \sqrt{r}} = r + \sqrt{r}$$

$$f(x) = \sqrt{x} + \frac{1}{\sqrt{x}} + r$$

$$f(r - \sqrt{r}) + f(r + \sqrt{r}) = f(\underbrace{r - \sqrt{r}}_x) + f\left(\frac{1}{r - \sqrt{r}}\right) =$$

$$f(x) + f\left(\frac{1}{x}\right) = \sqrt{x} + \frac{1}{\sqrt{x}} + r + \cancel{\sqrt{\frac{1}{x}}} + \frac{1}{\cancel{\sqrt{\frac{1}{x}}}} + r = \varepsilon + r\sqrt{x} + \frac{r}{\sqrt{x}} =$$

$$\varepsilon + r\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right) = \varepsilon + r\sqrt{4}$$

$$\frac{x+1}{\sqrt{x}} \leadsto S$$

$$S^r = \frac{(r - \sqrt{r})^r}{r - \sqrt{r}} \times \frac{r + \sqrt{r}}{r + \sqrt{r}} = (1r - 4\sqrt{r})(r + \sqrt{r}) =$$

$$r\varepsilon + 1r\sqrt{r} - 1r\sqrt{r} - 1r = 4$$

$$\Rightarrow S = \sqrt{4}$$

$$= \varepsilon + \sqrt{4 - 4\sqrt{\mu}} - \sqrt{4 + 4\sqrt{\mu}} + \mu\sqrt{1 - \sqrt{\mu}} + \mu\sqrt{1 + \sqrt{\mu}}$$

$$\begin{aligned} (1f(x) - \mu f(-x) &= \varepsilon x^r - x) \times \nu & \left\{ \begin{aligned} 1f(x) - \cancel{4f(-x)} &= 1x^r - 1x \\ -9f(x) + \cancel{4f(-x)} &= 12x^r + \mu x \end{aligned} \right. \\ (1f(-x) - \mu f(x) &= \varepsilon x^r + x) \times \mu & \hline -5f(x) &= 10x^r + x \\ \Rightarrow f(x) &= -\varepsilon x^r - \frac{x}{5} \end{aligned}$$

$$(x+1)f(x) - \mu x f(x+1) = \varepsilon x^r - mx + \mu m - 1$$

$$\xrightarrow{x=0} 1f(0) = \mu m - 1 \quad \xrightarrow{x=-1} 4f(0) = 14 + 1m + \mu m - 1 = 5m + 14$$

$$\Rightarrow \mu \times (\mu m - 1) = 5m + 14 \Rightarrow 9m - \mu = 5m + 14$$

$$\Rightarrow \varepsilon m = 14 \Rightarrow m = \frac{14}{\varepsilon} = \frac{9}{\varepsilon} \Rightarrow 1f(0) = \frac{14}{\varepsilon} - 1 = \frac{14}{\varepsilon} \Rightarrow f(0) = \frac{14}{\varepsilon}$$

$$f(x) + f\left(\frac{1}{x}\right) = \frac{10x^2 - 12x + 10}{x}$$

$$\underline{f(x) = ax + b} \rightarrow ax + b + \frac{a}{x} + b = \frac{10x^2 - 12x + 10}{x}$$

$$\Rightarrow ax^2 + bx + a = 10x^2 - 12x + 10 \Rightarrow a = 10 \quad b = -4$$

$$f(x) = 10x - 4 \leadsto f(-1) = -10 - 4 = \underline{-14}$$