

الف) $f(x) = \sqrt{\frac{x-1}{x}} - \frac{x}{x-1}$

$\sqrt{\frac{(x-1)^2 - x^2}{x(x-1)}} \rightarrow \sqrt{\frac{1-2x}{x^2-x}}$ (0/0)

$\frac{0}{0} \rightarrow \frac{+}{-} \rightarrow \frac{+}{-}$

$\Rightarrow = (\infty, 0) \cup [0/0, +1)$

ب) $\frac{1}{x+1} - \frac{x}{x} = \frac{1}{x+1} + \frac{1}{x+x}$ (1) (0)
(1) (-2)

$\frac{x}{x-1} = \frac{1}{x+2} \rightarrow -x+1 = x_{x+2}$
 $-x = x_{x+2} \rightarrow x = -0/1$

$\Rightarrow = \mathbb{R} - \{-1, 0, 1, -2, -0/1\}$

الف) $f(x) = \sqrt{\left(\frac{1}{x}\right)^2 - 9} \cdot (3x - x^2)$

$\left(\frac{1}{x}\right)^2 - 9 \geq 0$
 $\frac{1}{x^2} - 9 \geq 0$
 $\frac{1-9x^2}{x^2} \geq 0$
 $\frac{+}{-} \rightarrow \frac{+}{+}$

$\Rightarrow = (-\infty, -1/3] \cup [1/3, +\infty)$

ب) $\sqrt{x-1} + \sqrt{y+1} = 3$

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

$\textcircled{I} x \geq 1$

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

$\Rightarrow f = [1, 10]$

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

$x^2 - x - 2 > 0 \rightarrow x = 2, -1 \rightarrow (-1, 2)$

$\sqrt{x^2 - 1} \geq 0 \rightarrow x = 1, -1 \rightarrow (-\infty, -1] \cup [1, +\infty)$

$\Rightarrow = I \cap II = (-\infty, -1] \cup (1, +\infty)$

$\sqrt{-x^2 + ax + 3} \quad [-2, 5]$

$\omega_{x=0} = \frac{c}{a} = -3 = -2.5 \rightarrow [b = 1/0]$

$\omega_{x=5} = -\frac{a}{2} \rightarrow a = -0/0$

$a + b = 1$

$f(x) = \begin{cases} 3x-2 & x \geq 1 \\ x+3 & x < 1 \end{cases} \quad g(x) = \sqrt{f(x) - x}$

$x \geq 1 \rightarrow g(x) = \sqrt{3x-2} \rightarrow x \geq 1 \quad \textcircled{I} \xrightarrow{IVII} [-3, +\infty)$

$x < 1 \rightarrow g(x) = \sqrt{x+3} \rightarrow x \geq -3 \quad \textcircled{II}$

$$f(u) = \begin{cases} (a+1)(u+r) & : u > 1 \\ ra + ru & : u \leq 1 \end{cases}$$

$$r f(u) = f(-r) + a$$

$$(ra+r)v = ra - \varepsilon \rightarrow 1 \varepsilon a + 1 \varepsilon = ra - \varepsilon$$

$$10a = -11 \rightarrow a = -1/11$$

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

$$f(r\sqrt{u}) + f(r+\sqrt{u}) = p$$

$$\frac{1}{\sqrt{r+\sqrt{u}}} \cdot \frac{1}{\sqrt{r-\sqrt{u}}} = \frac{1}{\sqrt{r^2 - u}}$$

$$\sqrt{r-\sqrt{u}} + \sqrt{r+\sqrt{u}} + r + \sqrt{r+\sqrt{u}} + \sqrt{r-\sqrt{u}} + r = p$$

$$2r + 2\sqrt{r^2 - u} + 2r = p$$

$$4r + 2\sqrt{r^2 - u} = p$$

$$2\sqrt{r^2 - u} = p - 4r$$

$$\sqrt{r^2 - u} = \frac{p - 4r}{2}$$

$$r^2 - u = \left(\frac{p - 4r}{2}\right)^2$$

$$r^2 - u = \frac{p^2 - 8rp + 16r^2}{4}$$

$$4r^2 - 4u = p^2 - 8rp + 16r^2$$

$$-4u = p^2 - 8rp + 12r^2$$

$$u = \frac{8rp - p^2 - 12r^2}{4}$$

$$r f(u) - r f(-u) = \varepsilon u^r - u \frac{x^r}{x^r}$$

$$r f(-u) - r f(u) = \varepsilon u^r + u \frac{x^r}{x^r}$$

$$r f(u) - r f(-u) = 11u^r - ru$$

$$r f(-u) - r f(u) = 11u^r + ru$$

$$-10f(u) = 10u^r + u$$

$$f(u) = -u^r - \frac{u}{10}$$

$$(u+r)f(u) - ru f(u+r) = fu^r - mu + r m - 1$$

$$f(0) = p$$

$$u = -r \rightarrow r f(0) = 14 + \frac{10 + 10m}{10m - 1}$$

$$u = 0 \rightarrow r f(0) = 10m - 1$$

$$f(0) = A$$

$$r(14A - 10 - 10m) = 0 \rightarrow 14A - 10 - 10m = 0$$

$$(-10)(14A - 10m + 1) = 0 \rightarrow -14A + 10m - 10 = 0$$

$$14A = 10$$

$$A = \frac{10}{14}$$

$$f(0) = \frac{10}{14}$$

$$f(u) + f\left(\frac{1}{u}\right) = \frac{ru^r - ru + r}{u} \xrightarrow{u=1} r f(-1) = -11$$

$$f(-1) = -9$$