

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

ب) $\frac{x^2 - 5x - 2}{(x+1)x}$ $x \neq 0, -1, 1, -2$ $D_f = \mathbb{R} - \{\pm 1, 0, -2, -\frac{5}{4}\}$
 $\frac{2x+9+x-1}{(x-1)(x+2)} \rightarrow 2x+5 \neq 0 \quad x \neq -\frac{5}{2}$

الف) $(\frac{1}{x})^n - 9)(3x - x^n) \geq 0$ $x = -2 \rightarrow$ $\frac{-2}{+} \frac{0}{-} \frac{0}{+}$ $D_f = (-\infty, -2] \cup [\frac{5}{2}, +\infty)$
 $x = \frac{5}{2} \rightarrow$

ب) $\sqrt{x-1} + \sqrt{y+1} = 3$ $\textcircled{1} x \geq 1$
 $\textcircled{2} \sqrt{x-1} \leq 3 \quad x-1 \leq 9 \quad x \leq 10$ $\left. \begin{array}{l} \textcircled{1} x \geq 1 \\ \textcircled{2} x \leq 10 \end{array} \right\} 1 \leq x \leq 10 \Rightarrow D_f = [1, 10]$

$\textcircled{1} x^2 - x - 2 > 0$ $(x-2)(x+1) > 0$ $\frac{-1}{+} \frac{2}{-} \frac{2}{+} \rightarrow x > 2 \cup x < -1$

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

معرف همواره بزرگتر از صفر

$\textcircled{1} \cap \textcircled{2} \cap \textcircled{3} \Rightarrow D_f = (-\infty, -1) \cup (2, +\infty)$

$x = -2 \rightarrow$ $\sqrt{r+ax-x^2} \rightarrow +r - 2a - 4 = 0 \quad a = -\frac{1}{2}$
 $-x^2 - \frac{1}{2}a + 3 = 0$ $\frac{-b \pm \sqrt{\Delta}}{2a} = \frac{\frac{1}{2} \pm \sqrt{\frac{1}{4} + 12}}{-2} \rightarrow \frac{-\frac{1}{2}}{-2} = -2$
 $\rightarrow \frac{4}{-2} = \frac{3}{-2} = b$
 $a+b = \frac{3}{2} - \frac{1}{2} = 1$

$\textcircled{1} x \geq 1 \rightarrow \sqrt{2x-2-x} = \sqrt{x-2} \rightarrow 2x-2 \geq 0 \quad \boxed{x \geq 1}$

$\textcircled{2} x < 1 \rightarrow \sqrt{2x+2-x} = \sqrt{x+2} \rightarrow x+2 \geq 0 \quad x \geq -2 \rightarrow \boxed{-2 \leq x < 1}$

$\textcircled{1} \cup \textcircled{2} \rightarrow [-2, +\infty)$

$$f(x) = \sqrt{x} - \sqrt{x}$$

$$f\left(\sin \frac{\pi}{p} + \cos \sqrt{x}\right) = f\left(\frac{\sqrt{r}}{r} + 1\right)$$

$$\sqrt{\left(\frac{\sqrt{r}}{r} + 1\right)^r} - \sqrt{\left(\frac{\sqrt{r}}{r} + 1\right)} = \sqrt{\left(\frac{r}{r} + 1 + \sqrt{r}\right)} - \sqrt{\frac{r}{r}} - \sqrt{1} = \frac{r}{r} + 1 + \sqrt{r} - \sqrt{r} - 1 = \frac{1}{r}$$

$$f(a) = \frac{a+1}{a-1}$$

$$f(f(a)) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{\frac{a+1+a-1}{a-1}}{\frac{a+1-a+1}{a-1}} = \frac{\frac{2a}{a-1}}{\frac{2}{a-1}} = \frac{2a}{2} = a$$

$$\frac{a(a-1)}{a-1} = a$$

$$a \rightarrow a \neq 1 \Rightarrow D_f = \mathbb{R} - \{1\}$$

$$g(a) = \sqrt{a^2 - 1}$$

$$f(g(a)) = (\sqrt{a^2 - 1})^r - \sqrt[ry]{\sqrt{a^2 - 1}} = -r$$

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

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

$$f(r) = 1 - \omega + y = r$$

$$x + r_2 \in \mathbb{Z}$$

$$f(-r) = r^2 + r_0 + y_2 + r$$

$$x + r = -r \quad x = -r$$

$$\left. \begin{array}{l} f(r) = 1 - \omega + y = r \\ f(-r) = r^2 + r_0 + y_2 + r \end{array} \right\} \quad \forall r \in \mathbb{Z} \quad r = 1, r = -1$$

$$\sqrt{r} \cos x + \omega \cos x = \sqrt{r} \omega$$

$$\sqrt{r} \cos x + \omega \cos x - \sqrt{r} \omega = 0 \quad \cos x + \omega \cos x - 1 = 0$$

$$(\cos x + \sqrt{r})(\cos x - \sqrt{r}) = 0$$

$$\cos x = \frac{\sqrt{r}}{r} \times \frac{1}{\sqrt{r}}$$

$$\cos x = \frac{1}{r} \Rightarrow \frac{1}{r}$$

$$\Rightarrow \tan x = \sqrt{r} \rightarrow \tan x = (\sqrt{r})^r = \sqrt{r}$$

$$\Rightarrow f(r, \omega) = r$$