

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

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

2) $f(x) = \frac{1}{x+1} - \frac{2}{x}$ $x \neq 0, -1, -2, 1$
 $\frac{1}{x+1} + \frac{1}{x+2} \rightarrow \frac{2(x+2) + (x+1)}{(x+1)(x+2)} \rightarrow 3x + 5 + x - 1 = 4x - 4 \geq 0$
 $x \geq \frac{5}{4}$

$D_f = \mathbb{R} - \{-2, -1, 0, 1, \frac{5}{4}\}$

3) $f(x) = \sqrt{\left(\left(\frac{1}{3}\right)^x - 9\right)(32 - 4^x)}$

$\left(\frac{1}{3}\right)^x - 9 = 0 \rightarrow \frac{1}{3^x} = 9 \rightarrow 3^x = \frac{1}{9} \rightarrow x = -2$
 $32 - 4^x = 0 \rightarrow 4^x = 32 \rightarrow 2^{2x} = 2^5 \rightarrow 2x = 5 \rightarrow x = \frac{5}{2}$

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

4) $f(x) = \sqrt{x-1} + \sqrt{y+1} = 3 \rightarrow x-1 \geq 0, x \geq 1$
 $y+1 \geq 0, y \geq -1$

$0 \leq \sqrt{x-1} \leq 3$

$0 \leq x-1 \leq 9$
 $1 \leq x \leq 10$

$D_f = [1, 10]$

$$(x^2 - x - 2)$$

2

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

$$x^2-1 > 0 \Rightarrow x^2 > 1 \quad |x| > 1$$

$$x > 1, x < -1$$

$$(x-2)(x+1) \quad \begin{array}{c} -1 \quad 2 \\ + \quad | \quad - \quad | \quad + \\ (x-2)(x+1) \end{array}$$

$$x < -1 \cup x > 2$$

$$(-\infty, -1) \cup (2, \infty)$$

$$f(x) = \sqrt{3+ax-x^2}$$

$$-x^2 + ax + 3 \geq 0 \quad \begin{array}{c} -1 \quad 3 \\ -x^2 + ax + 3 \end{array}$$

$$\frac{-b}{2a} = \frac{-1}{-2} = \frac{1}{2} \quad \begin{array}{c} x = -1 \\ -1 - 1 + 3 = 1 \\ x = 3 \\ -9 + 3a + 3 = 0 \end{array}$$

$$-1 - 1 + 3 = 1 \quad -9 + 3a + 3 = 0 \quad a = 2$$

$$\frac{1}{2} - \frac{1}{2} = -1 + 2 = 1 \quad \frac{3}{2} = 1.5$$

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

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

$$f(x) - x \geq 0 \quad x \geq 1 \rightarrow 3x-2-x \geq 0 \rightarrow 2x-2 \geq 0 \rightarrow x \geq 1 \cap x \geq 1$$

$$f(x) - x \geq 0 \quad x < 1 \rightarrow 2x+3-x \geq 0 \rightarrow x+3 \geq 0 \quad x \geq -3 \cap x < 1$$

$$-3 \leq x < 1 \cup x \geq 1 \rightarrow D_f = [-3, \infty)$$

$$\frac{x^2}{x^2} + \frac{x}{x} + \sqrt{x}$$

$$f\left(\sin \frac{\pi}{r} + \cos \pi\right) \quad f(x) = 2x^2 - 5x$$

$$2\left(1 + \sqrt{\frac{r}{r}}\right)^2 - 5\left(1 + \sqrt{\frac{r}{r}}\right) \rightarrow \frac{2}{r} + 2\sqrt{r} - \frac{5}{r} - 2\sqrt{r} = -\frac{3}{r}$$

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

$$f(f(a)) = a$$

$$\frac{a+1+a-1}{a-1} = \frac{2a}{a-1}$$

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

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

$$\frac{a+1+a-1}{a-1} = \frac{2a}{a-1}$$

MICRO

$$a \in \mathbb{R} - \{1\}$$

$$\sqrt{a^2-1} = u$$

$$|a^2-1| - r\sqrt{a^2-1} = -r$$

(1)

$$\sqrt{a^2-1} = t$$

$$t^2 - r t + r = 0$$

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

$$r = |a^2-1|$$

$$(t-r)(t-r) \quad t=r$$

$$r = a^2-1 \quad a^2 = \omega$$

$$-r = a^2-1 \quad \text{XX}$$

$$a = \pm\sqrt{\omega}$$

$$f(-r) = r s + r_0 + s = v r$$

$$v r s r = |r s r$$

(9)

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

$$f(r \cos^2 x + \omega \cos x) = \tan^2 x$$

$$r \cos^2 x + \omega \cos x - r/\omega = 0$$

(10)

$$(t-r)(t+v) \quad t = \frac{r}{r} - \frac{v}{r} \quad \text{OOE}$$

$$r t^2 + \omega t - \frac{v}{r} = 0 \rightarrow t^2 + \omega t - 1/r = 0$$

$$\frac{r}{r} = \cos x \quad x = 90^\circ$$

$$\tan 90^\circ = \sqrt{r} \quad \tan^2 = r$$