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

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

$x \neq -1, 0, 1, -2$ $\frac{x+1}{(x-1)(x+2)}$ $\frac{x+1}{(x-1)(x+2)}$ $\frac{x+1}{(x-1)(x+2)}$

الف) $f(x) = \sqrt{(\frac{1}{x})^2 - 9} = \sqrt{\frac{1}{x^2} - 9}$ $D_f = \mathbb{R} - \{-\frac{1}{3}, -\frac{2}{3}, -1, 0, 1\}$

ب) $\sqrt{x-1} + \sqrt{y+1} \leq 2 \rightarrow \sqrt{x-1} \leq 2 - \sqrt{y+1}$ $D_f = [1, 2]$

$f(x) = \log(x^2 - x - 2) = (x-2)(x+1) > 0$ $x > 2$
 $x < -1$

$f(x) = \sqrt{x^2 - 1} + 1$ $x^2 \geq 1$ $x \geq 1, x \leq -1$

$f(x) = \sqrt{x^2 + ax - x^2}$ $D_f = [-a, b]$ $a+b \leq 0$
 $\frac{x}{x} = \frac{1}{x}$

$g(x) = f(x) - x$ $x \geq 1$
 $x < 1$

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

$f(x) = \frac{x+1}{x-1}$ $f(f(x)) = a$ -5

$f(a) = \frac{a+1}{a-1}$ $f(\frac{a+1}{a-1}) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{a}{a-1}$ $a \neq 1$
 $a \in \mathbb{R} - \{1\}$

$$f(x) = x^2 - 2x \quad g(x) = \sqrt{x^2 - 1} \quad f(g(x)) = -2 \quad \text{as } \pm \sqrt{a} - 1$$

$$x^2 - 2x = -2$$

$$x^2 - 2x + 2 = 0 \rightarrow (x-1)^2 = -1 \rightarrow x = 1 \pm i$$

$$f(x+1) = x^2 - 2x + 1$$

$$f(x) \times f(-x) = ?$$

-9

$$x+1=2 \rightarrow x=1 \rightarrow 1-2+1=0$$

$$1 \times \sqrt{1} = 1$$

$$x+1=0 \rightarrow x=-1 \rightarrow 1-2+1=0$$

$$f(x \cos \theta + a \cos \theta) = \tan \theta$$

$$f(x, a)$$

-1,

$$x \cos \theta + a \cos \theta = \frac{1}{\tan \theta} \rightarrow x \cos \theta + a \cos \theta = \frac{1}{\tan \theta} \rightarrow x \cos \theta + a \cos \theta = \frac{1}{\tan \theta}$$

$$\left(\cos \theta + \frac{a}{x} \right) \left(\cos \theta - \frac{1}{x} \right) = 0$$

$$\cos \theta = \frac{-\frac{a}{x} \pm \sqrt{\left(\frac{a}{x}\right)^2 - \left(\frac{1}{x}\right)^2}}{1} \rightarrow \cos \theta = \frac{\left(\frac{\sqrt{a^2 - 1}}{x}\right)}{\left(\frac{1}{x}\right)} = \sqrt{a^2 - 1}$$