

الف) $x \neq 0$ $\Rightarrow$ $\frac{(x-1)^2 - x^2}{x(x-1)} = \frac{(x-1-x)(x-1+x)}{x(x-1)} = \frac{(-1)(2x-1)}{x(x-1)} = \frac{1}{x}$

صورت $\Rightarrow -1, 0$ $\Rightarrow$ $\frac{1}{x-1} + \frac{1}{x+2} \neq 0 \Rightarrow \frac{x^2 + 4 + x - 1}{(x-1)(x+2)} \neq 0 \Rightarrow x \neq -\frac{5}{2}$

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

الف) $x^2 - 9 = 0 \Rightarrow x = 3 \rightarrow x = -2$

$\frac{x^2}{x^2} = \frac{x^2}{x^2} \Rightarrow x = \frac{5}{2}$

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

ب) ① $x-1 > 0 \Rightarrow x > 1$

② $x - \sqrt{x-1} > 0 \Rightarrow \sqrt{x-1} \leq x \Rightarrow x-1 \leq x^2 \Rightarrow x \leq 1$

$D_f = [1, 1]$

① $x^2 - 1 > 0 \Rightarrow x > 1$ $x < -1$

② $\sqrt{x^2 - 1} + 1 \neq 0$

③ $x^2 - x - 2 > 0 \Rightarrow (x-2)(x+1) > 0 \Rightarrow x < -1$ $x > 2$

$\frac{x}{x^2} \mid \begin{array}{c} -2 \\ -1 \\ 0 \end{array} \begin{array}{c} 0 \\ + \\ 1 \end{array} \begin{array}{c} - \\ + \\ - \end{array}$ $\Rightarrow x^2 - 2x - 2 = 0 \Rightarrow x = 1 \pm \sqrt{3}$

$\rightarrow -(2x^2 + x - 4) = (x^2 + x - 12) = 0$

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

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

$2x + 3 - x \geq 0 \Rightarrow x \geq -3$

$g(x) = \frac{\sqrt{2x-2}}{\sqrt{x+3}}$ $x \geq 1$ $1 \leq x$

$x < 1 \Rightarrow -3 \leq x < 1$ $D_f = [-3, \infty)$

$$\sin \frac{\pi}{r} = \sqrt{\frac{r}{r}}$$

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

$$\cos \frac{\pi}{r} = 1$$

$$rx^r - rx = r(x - r)$$

$$rx \cdot \frac{\sqrt{r} + r}{r} \left(\frac{\sqrt{r} - r}{r} \right) = \frac{r - r}{r}$$

$$\boxed{-\frac{1}{r}}$$

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

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

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$$R - \{1\}$$

$$a \neq d = 0 \Rightarrow f \circ f(x) = x$$

$$D_f = R - \{1\}$$

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$$x^r - rx - r \Rightarrow x^r - rx + r = 0 \Rightarrow (x - r)^r = 0$$

$$f(x) = f(\sqrt{x-1}) \Rightarrow (x-1)^r = r \Rightarrow x-1 = r \Rightarrow x = r+1$$

$$\Rightarrow x = r \Rightarrow y(0) = r \Rightarrow \sqrt{a^r - 1} = r \Rightarrow a^r - 1 = r^2 \Rightarrow a^r = r^2 + 1$$

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

$$\boxed{1/10}$$

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$$f(x+r) = (x+r)(x-1) + r \Rightarrow f(x+r) = (x+r)(x-1) + r$$

$$x^r - rx - r + r$$

$$\Rightarrow f(x) = (x)(x-1) + r = x^2 - x + r$$

$$\Rightarrow f(-r) = (-r)(-1-r) + r = r \Rightarrow f(r) = (r)(-1-r) + r = -r$$

$$rx \cdot \sqrt{r} = 1 \Rightarrow \boxed{1/10}$$

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$$r \cos^r x + \Delta \cos x \xrightarrow{x=r} r \cos^r x + \Delta \cos x - r = 0$$

$$\cos^r x + \Delta \cos x - \Delta r = 0 \Rightarrow \left(\cos x + \frac{1}{r} \right) \left(\cos x - \frac{1}{r} \right)$$

$$\tan^r x = \frac{1}{\cos^r x} - 1 = r$$

$$\cos^r x + \Delta \cos x - 1 = 0$$

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$$f(\star) = -2 \rightarrow \star^2 - 4\star = -2 \rightarrow (\star - 2)^2 = 0 \rightarrow \star = 2 \checkmark$$

$$g(a) = 2 \rightarrow \sqrt{a^2 - 1} = 2 \rightarrow a^2 - 1 = 4 \rightarrow a^2 = 5 \rightarrow a = \pm\sqrt{5}$$