

الف) $\frac{x-1}{x} - \frac{x}{x-1} \geq 0$

ب) $x+1 \neq 0 \Rightarrow x \neq -1$
 $x-1 \neq 0 \Rightarrow x \neq 1$
 $x+2 \neq 0 \Rightarrow x \neq -2$

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

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

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

الف) $(\frac{1}{x})^x - 9 \geq 0$

ب) $\sqrt{y+1} = 3 - \sqrt{x-1} \Rightarrow \sqrt{y+1} \geq 0 \Rightarrow x-1 \leq 9 \Rightarrow x \leq 10$

$y+1 = 9 + x - 1 - 6\sqrt{x-1}$

$y = 8 - 6\sqrt{x-1} \Rightarrow x \geq 1 \Rightarrow x \in [1, 10]$

$D_f = (-\infty, -1] \cup [2, +\infty)$

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

$\sqrt{x^3 - 1} \wedge x^3 - 1 \geq 0 \Rightarrow x^3 \geq 1 \wedge x \geq 1, x \leq -1$

$D_f = (-\infty, -1] \cup [2, +\infty)$

$x^3 - 2x - 1 = 0 \Rightarrow a = -\frac{1}{x}$

$\sqrt{-x^3 - \frac{1}{x}x + 3} \wedge -x^3 - \frac{1}{x}x + 3 \geq 0 \Rightarrow \Delta \leq \frac{1}{x} + 12, \frac{49}{x} \wedge \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$a+b = -\frac{1}{x} + \frac{1}{x} = 0$

$f(x) - x \geq 0$

$x \geq 1 \Rightarrow 3x - 2 - x = 2x - 2 \geq 0 \Rightarrow x \geq 1$

$x < 1 \Rightarrow 2x + 3 - x = x + 3 \geq 0 \Rightarrow x \geq -3$

$D_f = [-3, +\infty)$

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

$$1 + \frac{r}{r} + \cancel{r\sqrt{r}} - f - \cancel{r\sqrt{r}} = \boxed{-\frac{1}{r}}$$

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$$f \neq 0 \quad n \neq 0 \rightarrow n \neq 1$$

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

$$\Rightarrow f(a) \neq 1 \rightarrow \frac{a+1}{a-1} \neq 1 \rightarrow a+1 \neq a-1 \rightarrow a \neq 1$$

$$f(f(a)) \rightarrow$$

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

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$$rx^r - rx = -r \rightsquigarrow rx^r = rx - r \rightsquigarrow x^r = rx - 1 \quad \begin{matrix} I \rightsquigarrow -\sqrt{rx-1} \\ II \rightsquigarrow +\sqrt{rx-1} \end{matrix}$$

$$I \Rightarrow \sqrt{x^r-1} = \sqrt{rx-1} \rightsquigarrow x^r-1 = rx-1$$

$$II \Rightarrow \sqrt{x^r-1} = -\sqrt{rx-1} \quad x^r - rx + 1 = 0 \rightsquigarrow \boxed{x=1}$$

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$$x=1 \rightsquigarrow f(r) = 1 - r + r = r \quad \left\{ \begin{array}{l} x=-r \rightsquigarrow f(-r) = r^r + r^0 + r = \\ \boxed{r^r + r} \end{array} \right.$$

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$$f(r) \times f(-r) = r \times r^r = \boxed{r^{r+1}}$$

$$\cos n + \cos n = 2 \cos n \rightarrow \cos n = \frac{1}{2} \Rightarrow n = 90^\circ$$

$$f(\mu a) = \tan^r \theta_0 \rightarrow f(\mu a) = (\sqrt{\mu})^r = \boxed{\mu}$$

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