

الف) $f'(x) = \sqrt{\frac{x-1}{x}} - \frac{x}{x-1}$ ① $x \neq 0, x \neq 1$ فصل ۱

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

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

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

$\frac{x}{x-1} + \frac{1}{x+2} \neq 0 \Rightarrow \frac{x(x+2) + 1(x-1)}{(x-1)(x+2)} \neq 0 \Rightarrow \frac{x^2 + 3x - 1}{(x-1)(x+2)} \neq 0$

$x^2 + 3x - 1 \neq 0 \Rightarrow x \neq \frac{-3 \pm \sqrt{17}}{2} \Rightarrow D_f = \mathbb{R} - \left\{ -\frac{3}{2}, -1, \frac{-3 + \sqrt{17}}{2}, 0, 1 \right\}$

الف) $f(x) = \sqrt{\left(\left(\frac{1}{x}\right)^x - 4\right)(32 - x^x)}$ فصل ۲

$\left(\left(\frac{1}{x}\right)^x - 4\right)(32 - x^x) \geq 0$ $\Rightarrow x = -2 \quad \rightarrow x = 2, 4$

ب) $\sqrt[3]{x-1} + \sqrt{y+1} = 3$

① $x-1 \geq 0 \Rightarrow x \geq 1$ ② $\sqrt[3]{x-1} \leq 3 \Rightarrow x-1 \leq 27 \Rightarrow x \leq 28$

$\Rightarrow D_f = [1, 28]$

$f(x) = \frac{\log_2(x^2 - x - 2)}{\sqrt{x^2 - 1} + 1}$ فصل ۳

① $x^2 - x - 2 > 0 \Rightarrow x = -1, x = 2 \Rightarrow x > 2, x < -1$ ② $x^2 - 1 \geq 0 \Rightarrow x = -1, x = 1 \Rightarrow x \geq 1, x \leq -1$

$\Rightarrow D_f = (-\infty, -1) \cup (2, \infty)$

سنة ٢٠٢٠

SUBJECT

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$$f(x) = \sqrt{x+ax-n^2} \quad , D_f = [-r, b] \Rightarrow a+b = ? \quad (5)$$

$$x+ax-n^2 \geq 0 \Rightarrow x^2-ax-n^2 \leq 0 \quad x = -r, x = b$$

$$\frac{-b}{a} = -r+b \Rightarrow \frac{a}{1} = -r+b \quad \frac{c}{a} = b \times -r \Rightarrow -r = b \times -r \Rightarrow b = \frac{r}{r}$$

$$\hookrightarrow a = -r + \frac{r}{r} \Rightarrow a = -\frac{1}{r} \Rightarrow a+b = 1$$

$$f(x) = \begin{cases} x^n - r & x \geq 1 \\ rx + r & x < 1 \end{cases}$$

$$\Rightarrow D_g = ? \quad g(x) = \sqrt{f(x)-n}$$

$$f(x) \geq n \quad \text{---}$$

$$\Rightarrow x^n - r \geq n \Rightarrow x^n - n \geq r \Rightarrow x \geq 1 \quad [1, +\infty)$$

$$\Rightarrow rx + r \geq n \Rightarrow rx - n \geq -r \Rightarrow x \geq -\frac{r}{r} \Rightarrow [-\frac{r}{r}, 1) \quad \text{---}$$

$$\Rightarrow D_g = [-\frac{r}{r}, +\infty) \quad \text{---}$$

$$f(x) = rx^r - \frac{r}{2}x \Rightarrow f\left(\sin \frac{\pi}{r} + \cos r\pi\right) = ? \quad (6)$$

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

$$\Rightarrow f\left(\frac{\sqrt{r}}{r} + 1\right) = r\left(\frac{\sqrt{r}}{r} + 1\right)^r - \frac{r}{2}\left(\frac{\sqrt{r}}{r} + 1\right) \Rightarrow \frac{r}{r} + \frac{r}{r} - \frac{r}{2} = \frac{r}{r} - \frac{r}{2} = -\frac{1}{r}$$

$$f(x) = \frac{n+1}{n-1} \quad f(f(a)) = a \quad (7)$$

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

$$\hookrightarrow D_{(f)} = \{a \mid a \in \mathbb{Z}, a \neq 1\}$$

$$f(x) = x^r - \varepsilon, \quad g(x) = \sqrt{x^r - 1}, \quad f(g(a)) = -\varepsilon \Rightarrow a = ? \quad (1)$$

$\hookrightarrow \sqrt{a^r - 1}$

$$f(\sqrt{a^r - 1}) = (\sqrt{a^r - 1})^r - \varepsilon \sqrt{a^r - 1} = -\varepsilon \rightarrow K^r - \varepsilon K + \varepsilon = 0$$

$$(K - \varepsilon)^r = 0 \Rightarrow K = \varepsilon \Rightarrow \sqrt{a^r - 1} = \varepsilon \rightarrow a^r - 1 = \varepsilon^2 \Rightarrow a^r = 1 + \varepsilon^2$$

$$a = \pm \sqrt[r]{1 + \varepsilon^2} \quad (2)$$

$$f(m + \frac{1}{2}) = m^r - am + \frac{1}{4} \Rightarrow f(2) \times f(-2) = ? \quad (3)$$

$$f(2) \rightarrow m + \frac{1}{2} = 2 \Rightarrow m = \frac{3}{2} \rightarrow f(2) = 1 - \frac{3}{2} + \frac{1}{4} = -\frac{1}{4}$$

$$f(-2) \rightarrow m + \frac{1}{2} = -2 \Rightarrow m = -\frac{5}{2} \rightarrow f(-2) = \frac{25}{4} + \frac{5}{2} + \frac{1}{4} = \frac{35}{2}$$

$$f(\varepsilon \cos^r \alpha + \delta \cos \alpha) = \tan^r \alpha \Rightarrow f(\varepsilon, \delta) = ? \quad (4)$$

$$\varepsilon \cos^r \alpha + \delta \cos \alpha = \frac{1}{\delta} \rightarrow \cos \alpha = t$$

$$\varepsilon t^r + \delta t = \frac{1}{\delta} \Rightarrow \Delta t^r + 10t - \frac{1}{\delta} = 0 \Rightarrow \Delta = 1 \dots \frac{1}{\sqrt{2}} = 11$$

$$\rightarrow \frac{t}{1} = \frac{1}{r}, \quad \frac{t}{\frac{1}{\sqrt{2}}} = \frac{1}{\frac{1}{\sqrt{2}}}$$

$[-1, 1] \times$

$$\rightarrow \cos \alpha = \frac{1}{r} \Rightarrow \tan^r \alpha = \frac{\frac{1}{\sqrt{2}}}{\frac{1}{r}} = \frac{r}{\sqrt{2}} \Rightarrow f(\varepsilon, \delta) = \frac{r}{\sqrt{2}}$$