

۲. آخرین مای نویسی

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$$\text{الف) } \varphi(x) = \sqrt{\frac{x-1}{x} - \frac{x}{x-1}} \rightarrow \frac{x-1}{x} - \frac{x}{x-1} \geq 0 \rightarrow \frac{x^2 - 2x + 1 - x^2}{x(x-1)} \geq 0 \rightarrow \frac{-2x+1}{x(x-1)} \geq 0 \rightarrow \frac{1}{x-1} \geq \frac{1}{x}$$

$$\Rightarrow D_\varphi = (-\infty, 0) \cup \left(\frac{1}{2}, 1\right)$$

$$\text{ب) } \varphi(x) = \frac{1}{\frac{1}{x+1} - \frac{1}{x}} \rightarrow \text{مخرج های فرعی مان: } \left\{ -1, 0, 1, -\frac{1}{2} \right\} \rightarrow \frac{\frac{x-2x-2}{x(x+1)}}{\frac{3x+7+x-1}{(x-1)(x+2)}} = \frac{\frac{-x-2}{x(x+1)}}{\frac{4x+6}{(x-1)(x+2)}}$$

$$\rightarrow \text{مخرج های اصلی مان: } \left\{ -\frac{5}{4} \right\} \Rightarrow D_\varphi = \mathbb{R} - \left\{ -\frac{5}{4}, -1, 0, 1 \right\}$$

$$\text{الف) } \varphi(x) = \sqrt{\left(\left(\frac{1}{x}\right)^x - 9\right)(32 - 4^x)} \rightarrow \left(\left(\frac{1}{x}\right)^x - 9\right)(32 - 4^x) \geq 0 \rightarrow \begin{cases} \left(\frac{1}{x}\right)^x - 9 = 0 \Rightarrow x = -2 \\ 32 - 4^x = 0 \Rightarrow x = \frac{5}{2} \end{cases}$$

$$\Rightarrow D_\varphi = (-\infty, -2] \cup \left[\frac{5}{2}, +\infty\right)$$

$$\text{ب) } \sqrt{x-1} + \sqrt{y+1} = 3 \rightarrow \begin{cases} x-1 \geq 0 \Rightarrow x \geq 1 \\ \sqrt{y+1} = 3 - \sqrt{x-1} \end{cases} \rightarrow \text{چون } \sqrt{y+1} \geq 0 \rightarrow 3 - \sqrt{x-1} \geq 0 \rightarrow \sqrt{x-1} \leq 3 \rightarrow x-1 \leq 9 \rightarrow x \leq 10 \Rightarrow D_\varphi = [1, 10]$$

$$\varphi(x) = \frac{\log_2(x^2 - x - 2)}{\sqrt{x^2 - 1} + 1} \rightarrow \begin{cases} x^2 - x - 2 \geq 0 \rightarrow (x-2)(x+1) \geq 0 \Rightarrow x \in (-\infty, -1) \cup (2, +\infty) \text{ (۱)} \\ x^2 - 1 \geq 0 \Rightarrow \frac{-1}{x-1} \geq \frac{1}{x+1} \Rightarrow x \in (-\infty, -1] \cup [1, +\infty) \text{ (۲)} \end{cases}$$

$$\text{① و ②} \Rightarrow D_\varphi = (-\infty, -1) \cup (2, +\infty)$$

منبرج تشریحی آرد ۲ - اینها منبرج ۲

$$\varphi(x) = \sqrt{3 + ax - x^2} \rightarrow 3 - 2a - 4 = 0 \rightarrow -2a = 1 \Rightarrow a = -\frac{1}{2}$$

$$D_\varphi = [-2, b] \rightarrow -3 = -2b \Rightarrow b = \frac{3}{2}$$

$$a + b = -\frac{1}{2} + \frac{3}{2} = 1$$

$$\varphi(x) = \begin{cases} 3x - 2 & x \geq 1 \\ 2x + 3 & x < 1 \end{cases} \rightarrow \text{حالت اول (} x \geq 1 \text{): } 3x - 2 \geq x \rightarrow 2x \geq 2 \rightarrow x \geq 1 \rightarrow \text{با هم شرط است } x \geq 1 \text{ (۶)}$$

$$g(x) = \sqrt{\varphi(x) - x} \rightarrow \text{حالت دوم (} x < 1 \text{): } -(2x + 3) \leq -x \rightarrow 2x + 3 \geq x \Rightarrow x \geq -3 \rightarrow x \in [-3, 1) \text{ (۷)}$$

$$\varphi(x) \geq x \Rightarrow D_g = \text{① و ②} = [-3, +\infty)$$

$$\varphi(x) = x^p - f x \quad \varphi\left(\sin \frac{\pi}{p} + \cos \frac{\pi}{p}\right) = \varphi\left(\frac{\sqrt{p}}{p} + 1\right) = \varphi\left(\frac{1+\sqrt{p}}{p}\right)$$

$$\varphi(x) = x(x^p - f x) = x(x-1)^p - f \Rightarrow \varphi\left(\frac{\sqrt{p}}{p} + 1\right) = x\left(\frac{\sqrt{p}}{p} + 1 - 1\right)^p - f =$$

$$x\left(\frac{p}{p}\right) - f = \frac{p}{p} - f = -\frac{f}{p} \quad \text{D}$$

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$$\varphi(x) = \frac{x+1}{x-1} \quad \varphi(a) = \frac{a+1}{a-1} \quad \varphi \circ \varphi(a) = \varphi\left(\frac{a+1}{a-1}\right) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{\frac{a+1+a-1}{a-1}}{\frac{a+1-a+1}{a-1}} = \frac{2a}{2} = a \Rightarrow a \in \mathbb{R} - \{1\} \quad \text{D}$$

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$$\varphi(x) = x^p - f x \quad g(x) = \sqrt{x^p - 1} \quad g(x) = u \quad \varphi(u) = -f \Rightarrow u^p - f u = -f \Rightarrow u^p - f u + f = 0 \Rightarrow (u-p)^p = 0 \Rightarrow u = p$$

$$\varphi \circ g(a) = -f$$

$$g(a) = u = p \rightarrow \sqrt{a^p - 1} = p \Rightarrow a^p - 1 = f \Rightarrow a^p = f + 1 \Rightarrow a = \sqrt[p]{f+1} \quad \text{D}$$

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$$\varphi(x+y) = x^p - 2x + 7 \quad \varphi(1) = 1 - 2 + 7 = 6$$

$$\varphi(-3) = (-3)^p + 10 + 7 = 17$$

$$\varphi(1) \times \varphi(-3) = 6 \times 17 = 102 \quad \text{D}$$

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$$\varphi(f \cos^2 x + \omega \cos x) = \tan^2 x \quad f \cos^2 x + \omega \cos x = 1, \omega \rightarrow f \cos^2 x + \omega \cos x - 1, \omega = 0$$

$$\xrightarrow{\cos^2 x + \omega \cos x - 1 = 0} \cos^2 x + \omega \cos x - 1 = 0 \Rightarrow (\cos x + \omega)(\cos x - 1) = 0 \Rightarrow \begin{cases} \cos x = 1 \Rightarrow \cos x = \frac{1}{f} \\ \cos x = -\omega \Rightarrow \cos x = \frac{\omega}{f} \end{cases}$$

$$\cos x = -\frac{\omega}{f} \Rightarrow \cos x = \frac{1}{f} \Rightarrow \varphi(1, \omega) = \frac{1}{\frac{1}{f}} = f \quad \text{D}$$

$$\sin^2 x + \cos^2 x = 1 \rightarrow \sin^2 x + \frac{1}{f} = 1 \Rightarrow \sin^2 x = \frac{f-1}{f} \Rightarrow \sin x = \frac{\sqrt{f-1}}{\sqrt{f}}$$