

نام و نام خانوادگی شماره کلاس پاسخنامه تشریحی تکلیف شماره
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$$\text{الف) } \varphi(x) = \sqrt{\frac{x-1}{x} - \frac{x}{x-1}} \rightarrow \frac{x-1}{x} - \frac{x}{x-1} \geq 0 \rightarrow \frac{x^2 - 2x + 1 - x^2}{x(x-1)} \geq 0 \rightarrow \frac{-2x+1}{x(x-1)} \geq 0 \rightarrow \frac{1}{x-1} \geq \frac{1}{x}$$

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

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

$$\rightarrow \text{مخرج های اصلی مان: } \left\{ -\frac{5}{4}, -1, 0, 1, -2 \right\} \Rightarrow D_\varphi = \mathbb{R} - \left\{ -2, -\frac{5}{4}, -1, 0, 1 \right\}$$

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

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

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

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

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

منبرج کتبی شماره ۲ - رابطه منبری

$$\varphi(x) = \sqrt{3+ax-x^2} \rightarrow \begin{cases} 3+ax-x^2 \geq 0 \rightarrow -x^2+ax+3 \geq 0 \rightarrow x^2-ax-3 \leq 0 \rightarrow (x-3)(x+1) \leq 0 \Rightarrow x \in [-1, 3] \\ \text{حاصل منبرج رابطه ما است} \\ \text{طبق رابطه بین منبرج های ما} \end{cases}$$

$$D_\varphi = [-1, 3]$$

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

$$\varphi(x) = \begin{cases} 3x-2 & x \geq 1 \\ 2x+3 & x < 1 \end{cases} \rightarrow \begin{cases} 3x-2 \geq x \rightarrow 2x \geq 2 \rightarrow x \geq 1 \text{ (1)} \\ 2x+3 \geq x \rightarrow x \geq -3 \end{cases}$$

$$g(x) = \sqrt{\varphi(x) - x} \rightarrow \begin{cases} 3x-2-x \geq 0 \rightarrow 2x \geq 2 \rightarrow x \geq 1 \text{ (1)} \\ 2x+3-x \geq 0 \rightarrow x \geq -3 \end{cases} \Rightarrow x \in [-3, 1] \text{ (2)}$$

$$\varphi(x) \geq x \Rightarrow D_g = (1) \cup (2) = [-3, +\infty)$$

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

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

$$p\left(\frac{p}{p}\right) - p = p - p = -\frac{1}{p}$$

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$$\begin{aligned} \varphi(x) &= \frac{x+1}{x-1} & \varphi(a) &= \frac{a+1}{a-1} & \varphi \circ \varphi(a) &= \varphi\left(\frac{a+1}{a-1}\right) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{\frac{a+1+a-1}{a-1}}{\frac{a+1-a+1}{a-1}} \\ &= \frac{\frac{2a}{a-1}}{\frac{2}{a-1}} = \frac{2a}{2} = a \Rightarrow a \in \mathbb{R} - \{1\} \end{aligned}$$

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$$\begin{aligned} \varphi(x) &= x^p - f x & g(x) &= \sqrt{x^p - 1} & g(x) &= u & \varphi(u) &= -f \Rightarrow u^p - f u = -f \\ \varphi \circ g(a) &= -f & & & & & \rightarrow u^p - f u + f = 0 \Rightarrow (u-p)^p = 0 \\ & & & & & & \Rightarrow u = p \\ g(a) &= u = p \rightarrow \sqrt{a^p - 1} = p \Rightarrow a^p - 1 = p^2 \\ & \Rightarrow a^p = p^2 + 1 \Rightarrow a = \pm \sqrt[p]{p^2 + 1} \end{aligned}$$

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$$\begin{aligned} \varphi(x+y) &= x^p - 2x + 7 & \varphi(1) &= 1 - 2 + 7 = 6 \\ \varphi(-y) &= (-y)^p + 7 + 7 = y^p + 14 \\ \varphi(1) \times \varphi(-y) &= 6 \times y^p = 14y^p \end{aligned}$$

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$$\begin{aligned} \varphi(f \cos^p x + \omega \cos x) &= \tan^p x & f \cos^p x + \omega \cos x &= p, \omega \rightarrow f \cos^p x + \omega \cos x - p, \omega = 0 \\ \xrightarrow{\cos^p x + \omega \cos x - 1 = 0} & \cos^p x + \omega \cos x - 1 = 0 \Rightarrow (\cos x + p)(\cos x - p) = 0 \Rightarrow \begin{cases} \cos x = p \Rightarrow \cos x = \frac{1}{p} \\ \cos x = -p \Rightarrow \cos x = -\frac{1}{p} \end{cases} \\ \cos x = -\frac{1}{p} & \Rightarrow \cos x = \frac{1}{p} \Rightarrow \varphi(p, \omega) = \frac{p}{\frac{1}{p}} = p^2 \\ \sin^p x + \cos^p x &= 1 \rightarrow \sin^p x + \frac{1}{p^p} = 1 \Rightarrow \sin^p x = \frac{p^p - 1}{p^p} \end{aligned}$$