

1 - 2

الف: A یاز A کف

$$1) x \neq 0, x \neq 1, \frac{x-1}{x} - \frac{x}{x-1} \geq 0 \rightarrow \frac{x^2 - 2x + 1 - x^2}{x^2 - x} = \frac{1-2x}{x^2-x} \geq 0$$

$$+ \frac{1}{x} - \frac{1}{1} + \frac{1}{1} - \quad Df = (-\infty, 0) \cup \left[\frac{1}{2}, 1\right)$$

$$2) x \neq -1, x \neq 0, x \neq 1, x \neq -2, \frac{3}{x} + \frac{1}{x-1} \neq 0 \rightarrow \frac{3x + x - 1}{x^2 - x - 2} \neq 0 \rightarrow x \neq -\frac{1}{4} \rightarrow Df = \mathbb{R} - \{-2, -\frac{1}{4}, 0, 1, 2\}$$

$$3) \left(\frac{1}{x}\right)^n = 9 \rightarrow x = -2, \quad 3^2 = 9 = (x^2)^n \rightarrow x = 2, \omega \quad \frac{-2}{+} \frac{2, \omega}{-} \quad Df = (-\infty, -2] \cup [2, \omega, +\infty)$$

$$4) x > 1, y > -1, y = -1 \rightarrow \sqrt{x^2 - 1} + 0 = 0 \Rightarrow x = 1 \quad Df = [1, \infty)$$

$$5) x^2 - x - 2 > 0 \quad (x-2)(x+1) > 0 \quad \frac{-1}{+} \frac{2}{-} \quad x^2 - 1 > 0 \rightarrow \frac{-1}{+} \frac{1}{-} \quad Df = (-\infty, -1) \cup (2, +\infty)$$

$$6) -x^2 - 2x + 3 = 0 \rightarrow x = -1, \quad \text{با توجه به درجه دوم و علامت منفی و علامت مثبت از ریشه ها معلوم است:} \quad \frac{1}{x} \pm \sqrt{\frac{1}{x} + 2} = \frac{1}{x} \pm 2, \omega = -2, \omega \quad Df = [-2, \omega]$$

$$\Rightarrow b = 1, \omega \quad \text{و} \quad a + b = -\frac{1}{x} + 1, \omega$$

$$7) x \geq 1 \rightarrow g(x) = \sqrt{x^2 - 2} - x \rightarrow x^2 - 2 \geq 0 \rightarrow x \geq 1 \quad Df = [1, \infty)$$

$$x < 1 \rightarrow g(x) = \sqrt{x^2 + 2} - x \rightarrow x^2 + 2 \geq 0 \rightarrow x \geq -\sqrt{2}$$

$$8) f(a) = f(a + b) = 1/a + 1/b, \quad f(-2) = 3a - 4 = 1/a + 1/b = 3a - 4 \Rightarrow 1/a + 1/b = 3a - 4 \Rightarrow a = -1/4$$

$$9) \frac{c}{1+a} + \frac{c}{1+b} = c \rightarrow \frac{c}{3+\sqrt{3}} + \frac{c}{3-\sqrt{3}} = c \Rightarrow \frac{c(3-\sqrt{3} + 3+\sqrt{3})}{9-3} = c \Rightarrow \frac{6c}{6} = c \Rightarrow c = c$$

$$10) \sqrt{x} + \frac{1}{\sqrt{x}} = \sqrt{x + \frac{1}{x} + 2} = \sqrt{\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2} = \sqrt{x} + \frac{1}{\sqrt{x}} \Rightarrow f(x + \sqrt{3}) = f(x + \sqrt{3}) = 2\sqrt{x + \sqrt{3}}$$



$$\begin{aligned}
 & (1f(x) - 3f(-x) = 5x^2 - 2x) \quad (1f(-x) - 3f(x) = 5x^2 + 2x) \\
 \times & \quad (1f(x) - 3f(-x) = 1x^2 - 2x) \quad (4f(-x) - 9f(x) = 12x^2 + 2x) \\
 \rightarrow & -6f(x) = 10x^2 + 2x \rightarrow f(x) = \frac{10x^2 + 2x}{-6} = -\frac{5}{3}x^2 - \frac{1}{3}x
 \end{aligned}$$

$$x=0 \rightarrow 1f(0) = 1m-1 \rightarrow f(0) = \frac{1m-1}{1} \quad x=1 \rightarrow 4f(0) = 12 + 1m-1 = 9$$

$$\rightarrow f(0) = 10 + 0m \rightarrow \frac{1m-1}{1} = \frac{10 + 0m}{1} \rightarrow 1m-1 = 10+0m$$

$$\rightarrow m = 11 \rightarrow f(0) = \frac{1m-1}{1} = \frac{11-1}{1} = 10$$

$$f(x) + f\left(\frac{1}{x}\right) = ax + b + \frac{a}{x} + b = \frac{ax^2 + 1bx + a}{x} = \frac{1x^2 - 12x + 11}{x}$$

$$\rightarrow a=1, b=-12 \rightarrow 1x-12=f(x) \rightarrow f(-1) = -9$$