

$x^2 f(x+1) = 0 \rightarrow x_1 = 0$   
 $x_2: f(x) = x - y \rightarrow x = y$   
 $f(x+1) = 0 \rightarrow x = -1$   
 $x_2 = 1$   
 $f(x+1) = \frac{1}{x} - 1 = -\frac{1}{x}$   
 $D = [0, 1]$  ✓

$f(-x) = \sqrt{-x+1-x+2} = \sqrt{-2x+3}$   
 $x = 1 - x + 2$   
 $x = 1$   
 $D = (-\infty, 1]$  ✓

$\frac{x-1}{f(x)} \geq 0$   
 $D_f \subseteq [0, 2]$   
 $x \neq 0, 2, -1$   
 $D = (-1, 1] \cup (2, 3)$  ✓

$9x^2 - 6x^2 - 4x - 2 = (3x^2 + x + 1)(3x^2 - x - 2)$   
 $D_1 = D_2 \Rightarrow 3x^2 + x + 1 = 0$   
 $\Delta < 0$   
 $3x^2 - x - 2 = 0 \rightarrow x = -1$   
 $\sqrt{-1+2} = 1$   
 $R = \{x \mid 3x^2 - x - 2 = 0\}$

$f\left(\frac{f}{x}\right) = \frac{4f}{x^2} + \frac{f}{x} = \frac{4fx + f x^2}{x^2} = f \left( \frac{x^2 + 4x}{x^2} \right) = f \left( \frac{x^2 + 4x}{x^2} \right)$   
 $f(x) \geq f\left(\frac{f}{x}\right) \rightarrow x^2 + x \geq f \left( \frac{x^2 + 4x}{x^2} \right)$   
 $x^2 + x \geq f \left( \frac{x^2 + 4x}{x^2} \right)$   
 $x^2 + x \geq f \left( \frac{x^2 + 4x}{x^2} \right)$   
 $D = [-2, 0) \cup [2, +\infty)$  ✓

$$f(r) = f(r+1) = r-1 = ①$$

$$f(r) + f(10) = 11 \quad \checkmark$$

$$f(10) = f(r+r) = r \times 4 - 1 = ⑤$$

②

9

$$g(x) = x^r + 9x^r + 12x = (x+r)^r - 12$$

$$f(x) = x^r - 9x^r + 12x = (x-r)^r + 1$$

$$\rightarrow \frac{g(\sqrt{v}-r)}{f(\sqrt{r}+r)} = \frac{v-12v}{r+1} = \boxed{-11} \quad \checkmark$$

②

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$$f(x) = \sqrt{x+4\sqrt{x-4}} = \sqrt{(\sqrt{x-4}+4)r} = \sqrt{x-4} + r$$

$$g(x) = \sqrt{\sqrt{x-4}-4}r = |\sqrt{x-4}-4|$$

$$f(x) + g(x) = \sqrt{x-4} \rightarrow a=0, b=r, c=-4$$

$$\sqrt{x-4} \neq a+b\sqrt{x+c} \quad \frac{a+b}{c} = \boxed{-\frac{1}{r}} \quad \checkmark$$

②

1

$$x^r - 4x + r \xrightarrow{r} \frac{g}{f} = \left\{ \left( r, -\frac{1}{r} \right), (0, 1) \right\} \quad \checkmark$$

②

9

$$\text{ا) } f(rx) = \left\{ \left( \frac{1}{r}, r \right), \left( \frac{r}{r}, -1 \right), (r, r), \left( -\frac{1}{r}, 4 \right) \right\} \quad \checkmark$$

②

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$$\text{ب) } f(x^r) = \left\{ (\pm 1, r), (\pm \sqrt{r}, -1), (\pm r, r) \right\} \quad \checkmark$$

$$\text{ج) } r g^r(x) + 1 = \left\{ (-r, 19), (1, 3), (r, 9), (-1, 1) \right\} \quad \checkmark$$

$$\text{د) } \frac{rf}{g} = \left\{ (1, -1), (r, -1) \right\} \quad \checkmark$$