

Lesson 2 - Practice 2

⑭ $f(x) = x^2 + 2x$

→ $f(0) = 0$

→ $f(3) = 15$

→ $f(-3) = 3$

→ $f(a) = a^2 + 2a$

→ $f(-x) = (-x)^2 + 2(-x)$
 $= x^2 - 2x$

→ $f\left(\frac{1}{a}\right) = \frac{1}{a^2} + \frac{2}{a}$

⑮ $g(x) = \frac{1-x}{1+x}$

→ $g(2) = \frac{1-2}{1+2} = \frac{-1}{3}$

→ $g(-2) = \frac{1-(-2)}{1+(-2)} = \frac{3}{-1} = -3$

→ $g\left(\frac{1}{2}\right) = \frac{1-\frac{1}{2}}{1+\frac{1}{2}} = \frac{\frac{1}{2}}{\frac{3}{2}} = \frac{1}{2} \cdot \frac{2}{3} = \frac{1}{3}$

→ $g(a) = \frac{1-a}{1+a}$

→ $g(a-1) = \frac{1-(a-1)}{1+(a-1)} = \frac{1-a+1}{a} = \frac{2-a}{a}$

→ $g(-1) = \frac{1-(-1)}{1+(-1)} = \frac{2}{0} = \text{undefined}$

⑰ $f(x) = \begin{cases} 5 & \text{if } x \leq 2 \\ 2x-3 & \text{if } x > 2 \end{cases}$

→ $f(-3) = 5$

→ $f(0) = 5$

→ $f(2) = 5$

→ $f(3) = 2(3)-3 = 6-3 = 3$

→ $f(5) = 2(5)-3 = 10-3 = 7$

⑱ $f(x) = \begin{cases} 3x & \text{if } x < 0 \\ x+1 & \text{if } 0 \leq x \leq 2 \\ (x-2)^2 & \text{if } x > 2 \end{cases}$

→ $f(-5) = 3(-5) = -15$

→ $f(0) = 0+1 = 1$

→ $f(1) = 1+1 = 2$

→ $f(2) = 2+1 = 3$

→ $f(5) = (5-2)^2 = 9$

⑳ $f(x) = x^2 + 1$

→ $f(x+2) = (x+2)^2 + 1$

$= x^2 + 4x + 4 + 1$

$= x^2 + 4x + 5$

→ $f(x) + f(2)$

$x^2 + 1 + 2^2 + 1$

$x^2 + 1 + 5$

$x^2 + 6$

$$\textcircled{29} \quad f(x) = 3x + 2$$

$$\rightarrow f(a) = \boxed{3a + 2}$$

$$\rightarrow f(a+h) = 3(a+h) + 2$$

$$= \boxed{3a + 3h + 2}$$

$$\begin{aligned} \rightarrow \frac{f(a+h) - f(a)}{h} &= \frac{3a + 3h + 2 - (3a + 2)}{h} = \frac{\cancel{3a} + 3h + \cancel{2} - \cancel{3a} - \cancel{2}}{h} \\ &= \frac{3h}{h} = \boxed{3} \end{aligned}$$

$$\textcircled{35} \quad (-\infty, \infty)$$

$$\textcircled{36} \quad (-\infty, \infty)$$

$$\textcircled{37} \quad [-1, 5]$$

$$\textcircled{38} \quad [0, 5]$$

$$\textcircled{39} \quad (-\infty, 3) \cup (3, \infty)$$

$$\textcircled{40} \quad (-\infty, 2) \cup (2, \infty)$$

$$\textcircled{41} \quad x^2 - 1 \neq 0$$

$$(x+1)(x-1) \neq 0$$

$$x \neq -1 \quad x \neq 1 \rightarrow (-\infty, -1) \cup (-1, 1) \cup (1, \infty)$$

$$\textcircled{42} \quad x^2 + x - 6 \neq 0$$

$$(x+3)(x-2) \neq 0$$

$$x \neq -3 \quad x \neq 2 \rightarrow (-\infty, -3) \cup (-3, 2) \cup (2, \infty)$$

$$\textcircled{43} \quad f(x) = \sqrt{x-5}$$

$$x-5 \geq 0$$

$$x \geq 5 \rightarrow [5, \infty)$$

$$\textcircled{46} \quad g(x) = \sqrt{7-3x}$$

$$7-3x \geq 0$$

$$-3x \geq -7$$

$$x \leq \frac{7}{3} \rightarrow (-\infty, \frac{7}{3}]$$

$$(47) \quad h(x) = \sqrt{2x-5}$$

$$2x-5 \geq 0$$

$$2x \geq 5$$

$$x \geq \frac{5}{2} \rightarrow \boxed{\left[\frac{5}{2}, \infty \right)}$$

$$(48) \quad G(x) = \sqrt{x^2-9}$$

$$x^2-9 \geq 0$$

$$(x+3)(x-3) = 0$$

$$x = -3, x = 3$$

$$\begin{array}{c} \text{++} \quad | \quad \text{--} \quad | \quad \text{++} \\ -3 \quad \quad \quad 3 \end{array} \rightarrow \boxed{(-\infty, -3] \cup [3, \infty)}$$

$$(49) \quad g(x) = \frac{\sqrt{2+x}}{3-x}$$

$$2+x \geq 0, \quad 3-x \neq 0$$

$$-x \neq -3$$

$$x \geq -2$$

$$x \neq 3$$

$$\boxed{[-2, 3) \cup (3, \infty)}$$

$$(50) \quad g(x) = \frac{\sqrt{x}}{2x^2+x-1}$$

$$x \geq 0$$

$$2x^2+x-1 \neq 0$$

$$(2x-1)(x+1) \neq 0$$

$$\left[0, \frac{1}{2}\right) \cup \left(\frac{1}{2}, \infty\right)$$

$$2x-1 \neq 0 \quad x+1 \neq 0$$

$$2x \neq 1$$

$$x \neq -1$$

$$x \neq \frac{1}{2}$$

$$(52) \quad g(x) = \sqrt{x^2-2x-8}$$

$$x^2-2x-8 \geq 0$$

$$(x-4)(x+2) = 0$$

$$x = 4 \quad x = -2$$

$$\begin{array}{c} \text{++} \quad | \quad \text{--} \quad | \quad \text{++} \\ -2 \quad \quad \quad 4 \end{array}$$

$$\boxed{(-\infty, -2] \cup [4, \infty)}$$