

$$x^2 + 7x = ax - c \quad \text{if } x=a \Rightarrow a^2 + 7a = a^2 - c \Rightarrow 7a = -c \Rightarrow a = -\frac{c}{7}$$

✓

②

$$g(x) = 7x + b \xrightarrow{x=2} 7 = 14 + b \Rightarrow b = -7$$

$$\Rightarrow f(x) = \frac{x^2 + a}{7x - b} \Rightarrow 7 = \frac{4 + a}{7} \Rightarrow a = 11$$

✓

②

$$f(1) = \frac{1 + 11}{7(-1)} = \frac{12}{-7} = -\frac{12}{7}$$

$$\begin{aligned} 7 - a + b &= 0 & -a + b &= -7 & a - b &= 7 \\ 7(7) + 4a + b &= 0 & 4a + b &= -49 & 4a + b &= -49 \\ & & & & a &= -12, b = -1 \end{aligned}$$

$$\Rightarrow f(1) = \frac{4(1) + 1}{7(1) + 4(1) - 1} = \frac{5}{-12}$$

✓

②

$$-4(-1)^2 + a(-1) + b = 0 \Rightarrow -4 - a + b = 0 \Rightarrow a - b = -4$$

$$\begin{aligned} \Delta = 0 \Rightarrow a^2 + 14b = 0 & \Rightarrow \begin{aligned} 14a - 14b &= -44 \\ a^2 + 14b &= 0 \end{aligned} \\ a^2 + 14a &= -44 \Rightarrow a^2 + 14a + 44 = 0 \Rightarrow (a+1)^2 = 0 \\ \Rightarrow a &= -1, b = 5 \\ a + b &= -1 + 5 = 4 \end{aligned}$$

②

①

$$x^2 + mx + 1 \xrightarrow{\Delta=0} mx^2 - c < 0 \Rightarrow (m-7)(m+7) < 0$$

$$\Rightarrow \begin{array}{c} -7 & 7 \\ + \phi & - \phi + \end{array} \Rightarrow m \in (-7, 7)$$

$$\text{①} \cup \text{②} \rightarrow -7 < m < 7$$

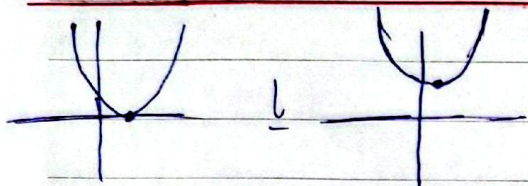
$$\text{②} \quad x^2 + mx + 1 \rightarrow \text{if } x=1 \text{ then } \Rightarrow$$

$$\begin{cases} \Delta = 0 \\ x = -\frac{b}{a} = 1 \end{cases} \rightarrow m^2 - 4 = 0 \rightarrow m = \pm 2, x = -\frac{m}{1} = 1 \rightarrow \boxed{m = -2 \text{ (I)}}$$

$$x - \frac{1}{x} > 0 \Rightarrow x^2 - 1 > 0 \Rightarrow (x-1)(x+1) > 0$$

$$\Rightarrow +\phi - \phi + \Rightarrow \mathbb{R} - (-\frac{1}{x}, \frac{1}{x})$$

(2) -6



$$a) 0 \Rightarrow m) 0 \quad \text{I}$$

$$\Delta = 0 \Rightarrow x^2 - x = 0 \Rightarrow x(x-1) = 0 \Rightarrow x < 0 \quad \text{II}$$

$$\Delta > 0 \Rightarrow x^2 - x < 0 \Rightarrow x(x-1) < 0 \Rightarrow +\phi - \phi + \Rightarrow m \in (0, 1) \quad \text{III}$$

$$\Rightarrow \bigcap_{I \cap II \cap III} = m \in [0, 1]$$

-V (2)

$$\frac{x^2 - 1}{x - 1} \Rightarrow x - 1 \neq 0 \Rightarrow x \neq 1 \Rightarrow x \neq \frac{1}{x} \Rightarrow a = \frac{1}{x}$$

(2) -1

$$x + k = x + 1 \xrightarrow{x = \frac{1}{x}} x + k = x \Rightarrow k = 0 \quad a + k = \frac{1}{x} + 0 = \frac{1}{x}$$

$$x^2 + ax = x + x \xrightarrow{x = \frac{1}{x}} x^2 + ax = x \Rightarrow a + x = x$$

(2) -9

$$\Rightarrow a^2 + a - x = 0 \Rightarrow (a+x)(a-1) = 0 \Rightarrow a < 1$$

$$\text{if } x = \frac{1}{x} \Rightarrow -x + x = -x + b \Rightarrow -x - b = -x$$

(2) -10

$$\text{if } x = -1 \Rightarrow \frac{4(-1)^2 - x}{x(-1) + x} = x(-1) + b \Rightarrow -4 = -x + b \Rightarrow b = -x \Rightarrow -x - (-x) = -x$$

$$a - b = x - (-x) = 2x$$