①

$f(a) \longrightarrow a^4 + 2a = a^2 - 4$

$a = -2$

②

$f(x) = \frac{x^2+11}{2x-(-1)} \rightarrow f(1) = \frac{1+11}{2+1} = \frac{12}{3} = 4$

$f(2) = \frac{4+a}{2-b}$

$g(2) = 4+b$

$\frac{4+a}{2-b} = 4+b \longrightarrow 4+a = 14-b^2$

$a = 14-4-1$

$a = 11$

$4+b=3$

$b=-1$

③

ریشه‌ها $= -1, 4 \longrightarrow (x+1)(x-4) = x^2-3x-4 = 2x^2+ax+b$

$f(1) \rightarrow \frac{4+1}{2+(-4)} = \frac{5}{-12}$

$\times 2 \;\; 2x^2-4x-8 = 2x^2+ax+b \rightarrow a=-4, b=-8$

④

$(x+1)(x+1) = x^2+2x+1 = -4x^2+ax+b$

$\times -4 \;\; -4x^2-8x-4 = -4x^2+ax+b \longrightarrow a=-8, b=-4 \longrightarrow -12 = 8-4$

⑤

$\Delta = 0$ یا $\Delta < 0$　　$b^2-4ac < 0$

$m^2-4 < 0$

$m^2 < 4 \rightarrow -2 < m < 2 \rightarrow (-2,2)$

ریشه $= 1$ و $(x-1) \rightarrow x = 1$

$1+m+1 = m+2 = 0 \rightarrow m = -2$ (ج)

$I \cup II$ → اجتماع → $[-2,2)$

⑥

$\frac{-1}{2}$　　0　　$\frac{1}{2}$

$- \;|\; + \;|\; - \;|\; +$

$\frac{1}{x^2} - 4 \geq 0 \rightarrow \frac{1-4x^2}{x^2} \geq 0$

$x^2 = 0 \rightarrow x = 0$

$1-4x^2 = 0$

$4x^2 = 1$

$x^2 = \frac{1}{4} \rightarrow x = \pm\frac{1}{2}$

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

⑦

$mx^2+2mx+1 \geq 0 \longrightarrow \begin{cases} m > 0 \\ \Delta \leq 0 \end{cases}$

$4m^2-4(m)(1) \leq 0 \longrightarrow 4m^2-4m \leq 0$

$4m(m-1) \leq 0$

$m \rightarrow [0,1]$

0　　1

$+ \;|\; - \;|\; +$

پس $\longrightarrow m \in (0,1]$

⑧

$a =$ ریشه‌ی صفرج $= 2x-1 = 0$

$2x = 1 \rightarrow x = \frac{1}{2} = a$

$\frac{1}{2} \times 4 + k = \frac{1}{2} \times 2 + 1$

$2+k = 1+1$

$k = 0$

$a+k = 0+\frac{1}{2} = \frac{1}{2}$

⑨

$$\frac{9x^2-4}{3x+2} = \frac{(3x+2)(3x-2)}{3x+2} \longrightarrow 3x-2 = 3x+b \rightarrow b=-2$$

$$g(x) = 3x+b \longrightarrow 3x-2 \longrightarrow \left(x=-\frac{2}{3}\right) \longrightarrow 3\left(-\frac{2}{3}\right)-2 = -2-2 = -4$$

$$f\left(-\frac{2}{3}\right)a+2 = -4 \longrightarrow -2a+2 = -4 \longrightarrow -2a = -6 \rightarrow a = 3$$

$$a-b = 3-(-2) = 3+2 = ⑤$$

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①

$$\frac{(x-2)(x+2)}{x-2} = x+2$$

$$2+2 = 4 = 2a^2+2a \longrightarrow 2a^2+2a-4 = 0$$

$$a^2+2a-8 = 0 \rightarrow (a+4)(a-2) = 0 \quad \begin{matrix} \nearrow -4 \\ \searrow 2 \end{matrix}$$