$y = -2x^2 + 8x + 6$ $(x+4)(x-2) \to x = 4$

$y = x^2 + 4x + 4$

(1)   (2)

$f(x) = mx^2 + 4x + \frac{m}{2} + 7 =$

$-b^2 + 4ac \to -16 + 4\left(m \times \left(\frac{m}{2} + 7\right)\right) =$

$2m^2 - 4m - 16 = 0$ $m - 4m - 32 = 0$ $m = -2, 4$

(9)   (1/5)

$y = -\frac{1}{2}(x-2)^2 + 4$ $y = a(x-h)^2 + k$

$y = -\frac{1}{2}x - 2 + 2x + 4$ $4a + 6 = 4$ $4a = -2$ $a = -\frac{1}{2}$

$\to \frac{-1}{-2+\sqrt{12}} + \frac{-1}{2-\sqrt{12}} = \frac{-2\sqrt{12} + 2 - \sqrt{12}}{(2-\sqrt{12})(2+\sqrt{12})} = 0$

$x^2 - 4x - 8 = 0$ $\frac{1}{\alpha} + \frac{1}{\beta} = -\frac{1}{2}$

(10)

$4 - (4a+4)x + 3a^2 + 6a + 3 = 0$

$4 - 2(4a+4) + 3a^2 + 6a + c = 0$ $4x - \frac{1}{2} + 6x - \frac{1}{2}$

$4 - 8a - 8 + 3a^2 + 6a + 3 = 0$ $-1 + -2 + c = 0$

$3a^2 - 2a - 1 = 0$ $a^2 - 2a - 3 = 0$

$(a+1)(a-3) = 0$

$(x-2)(x-6) = 0$ ✓ $x = 2, 6$

$a = 1 \to x^2 - 8x + 12 = 0$ $a = -\frac{1}{3}, 3$ (1/5)

$a = -\frac{1}{3} \to x^2 + \frac{8}{3}x + \frac{4}{3} = 0$ $x = 2, \frac{2}{3}$

$x\left(x - \frac{8}{3}\right) = 0$ $x = 0, \frac{8}{3}$

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(5)   (0/5)

$y = ax^2 + bx + c$ $a > 0$ $\Delta < 0$

$x = \frac{-b}{2a} = 2$ $b = -4a$ $4a = -b$

$\frac{-\Delta}{4a} = \frac{-(b^2 - 4a(5))}{4a} = 9$ $36a = -b^2 + 4ac$

$-16a^2 - 16a = 0$

$-16a(a-1) = 0$

$a = 1, 0$

$a = -1$

$(x-2)^2 < 9 \to -1 < x < 5$

(6)

$\alpha + \beta = \frac{7}{\alpha}$ $\alpha \cdot \beta = \frac{9\beta}{\alpha} \to \alpha = \pm 3$

$-\frac{9}{2} + \beta = -\frac{7}{2}$ (3)

$4 \times \left(\frac{4}{2} + \left(-\frac{1}{2}\right)\right) = -2 + 9 = \frac{7}{4}$

(7)   (1/75)

$\alpha^2 + \alpha m - 2m = 0$ $\alpha^2 = 2m - \alpha m$

$\beta^2 + \beta m - 2m = 0$

$2m - \alpha m - m\beta = 8$ $2m - m\underbrace{(\alpha + \beta)}_{-m} = 8$

$m^2 + 2m - 8 = 0$ $(m+4)(m-2) = 0$

$m = -4$

$x^2 - 4x + 8 = 0 \to \Delta < 0$

$x^2 + 2m - 4 = 0$ $\Delta > 0$

$S = -m = -2$

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$4(a-1) = -1$

$4a = 3 \quad a = \frac{3}{4}$

$x = \frac{-b}{2a} = 2 \quad \frac{-1}{2(a-1)} = 2$ (1)

$y = -\frac{1}{4}x^2 + x + 3 = 0$ (2)

$(x-6)(x+2) = 0 \Rightarrow x = 6, -2 \leftarrow y = 1x^2 - 4x - 12 = 0$

$(\sqrt{3})^2 - 4(\frac{3}{4}\times 3) < 0$ $\quad m < 0$

$\Delta \geq 0 \quad 25 - 4m^2 \geq 0$ (2) (1)

$-4m^2 \geq -25 \quad 4m^2 < 25 \quad m^2 < \frac{25}{4}$

$-6 \times c = 2$

$c = -\frac{1}{3}$ $\quad -\frac{5}{2} < m < \frac{5}{2} \rightarrow -\frac{5}{2} < m < 0$

(3)

$x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{3+\sqrt{5}}{4} \quad 2a = c \quad a = \frac{c}{2}$ (1)

$-b = 3 \quad b = -3$

$b^2 - 4ac = 9 - 4(\frac{c}{2})(c) = 5 \quad 9 - 2c = 5 \quad -2c = -4$

$c = \frac{2}{3}$

$6y = 9x^2 + 4x - 18 \quad 9x^2 - 18x + 4$

$4 - (4a+4)2 + 3a^2 + 6a + 4 = 0$ (4)

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$4 - 2(4a+4) + 3a^2 + 6a + c = 0$

$4 - 8a - 8 + 3a^2 + 6a + c = 0$

$3a^2 - 2a - 1 = 0 \quad a^2 - 2a - 3 = 0 \quad a = +1, -\frac{1}{3}$ (6) (2)

$(a-3)(a+1) = 0$ $\quad (x-6)(x-2)$

$-\frac{4}{3} + \frac{14}{3} = \frac{10}{3} \quad a = 1 \rightarrow x^2 - 8x + 14 = 0$

$a = -\frac{1}{3} \rightarrow x^2 - \frac{8}{3}x = 0 \rightarrow x = 0, \frac{8}{3}$

$2(s^2 - 2p) - (s)(\frac{\sqrt{\Delta}}{|a|}) = 2$

$m = 4$