

$$\begin{cases} -\frac{b}{ra} = -1 \\ -\frac{\Delta}{ra} = 9 \end{cases} \quad \begin{cases} 1 = 9a + rb + c \\ 9 = a - b + c \\ -1 = 9a + rb \end{cases} \rightarrow ra = -r - b \rightarrow \frac{-b}{ra} = \frac{-b}{-r-b} = -1$$

$$\rightarrow b = -1, a = \frac{-1}{r}, c = \frac{10}{r}$$

$$\rightarrow y = \frac{-x^2}{r} - x + \frac{10}{r}$$

① $\Delta > 0 \rightarrow b^2 - 4ac = m^2 - 4m - 24 > 0 \rightarrow (m-12)(m+2) > 0 \rightarrow \frac{-2}{4} < m < 12$

② $S > 0 \rightarrow \frac{-b}{a} > 0 \rightarrow \frac{-m}{r} > 0 \rightarrow \frac{m}{r} < 0 \rightarrow m < 0$

③ $P > 0 \rightarrow \frac{m+4}{r} > 0 \rightarrow m > -4$

①②③ $\rightarrow m \in (-4, -2)$

$$S = \frac{1}{p} \rightarrow \frac{-b}{a} = \frac{a}{c} \rightarrow ar = -bc \rightarrow 9 = -(r-m)(r-1)$$

$$rm^2 - am + r - 9 = rm^2 - am - 12 = 0 \rightarrow m^2 - am - 12 = 0 \rightarrow (m-5)(m+2) = 0$$

$$m = \frac{5}{r}, -1$$

$$\rightarrow \Delta > 0 \rightarrow m = -1 \rightarrow rm^2 - rm + 1 = 0 \rightarrow \Delta = 9 - 12 = -3 < 0$$

$$\hookrightarrow m = \frac{5}{r} \rightarrow rm^2 - 4m - 12 = 0 \rightarrow \Delta = 16 + 12 = 28 > 0 \rightarrow m = \frac{5}{r}$$

$$n_1 + n_2 + S = 1 \quad | \quad n_1 \cdot n_2 + P = 2$$

$$S' = n_1 r_1 + \frac{1}{n_2} + n_2 r_2 + \frac{1}{n_1} = (S^2 - 4SP) + \frac{n_1 + n_2}{n_1 \cdot n_2} = 12 - \frac{1}{2} = \frac{23}{2}$$

$$P' = (n_1 r_1 + \frac{1}{n_2}) (n_2 r_2 + \frac{1}{n_1}) = (n_1 \cdot n_2)^2 + \frac{n_1^2 + n_2^2}{n_1 \cdot n_2} + \frac{1}{n_1 \cdot n_2}$$

$$= (2)^2 + 1 - 2(-2) + \frac{1}{-2} = 4 + 2 + 1 - \frac{1}{2} = 7 - \frac{1}{2} = \frac{13}{2}$$

$$\rightarrow (n')^2 - \frac{23}{2} n' - \frac{13}{2} = 0$$

$$(\sqrt{n^2} + \frac{1}{\sqrt{n^2}} + 1)(\sqrt{n^2} - 1) = 2\sqrt{n} \xrightarrow{\times \sqrt{n}} (\sqrt{n^2} + 1 + \sqrt{n^2})(\sqrt{n^2} - 1) = 2n - 1$$

$$2n^2 - 12n \rightarrow n^2 - 6n - 1 = 0 \rightarrow S = 2$$

