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19, 18

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$$y = (a-1)x^2 + x + r \quad \frac{-b}{2a} = r = \frac{-1}{2a-2} = r \Rightarrow 2a-2 = -1 \rightarrow a = \frac{1}{2} \quad (19, 18)$$

$$y = \frac{-1}{2}x^2 + x + r \Rightarrow y = \left(-\frac{1}{2}x + r\right)\left(\frac{1}{2}x + 1\right) = 0 \quad \begin{matrix} < 0 \\ > 0 \end{matrix} \quad \begin{matrix} \checkmark \\ \times \end{matrix} \quad \text{+ clab}$$

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$$mx^2 - \omega x + m \rightarrow \begin{matrix} x_1 & x_2 \\ - & + \\ | & | \\ - & - \end{matrix} \Rightarrow a < 0 = m < 0 \quad I \quad (2)$$

$$\Delta > 0 \rightarrow 4\omega - 4m^2 > 0 \Rightarrow m^2 < \frac{\omega}{4}$$

$$-\frac{\omega}{4} < m < \frac{\omega}{4} \quad II$$

$$In \quad II = \left(-\frac{\omega}{4}, 0\right) \quad \checkmark$$

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$$\frac{r-\sqrt{\omega}}{r}, \frac{r+\sqrt{\omega}}{r} \rightarrow y = a(x^2 - Sx + P), \quad S = r = \frac{r+r}{r} = r \quad \left. \begin{matrix} \\ \\ \end{matrix} \right\} a = 9 \quad (2)$$

$$P = x_1 \cdot x_2 = \frac{r}{9}$$

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

$$15. \quad rx^2 - \lambda x + m + r = 0 \quad \alpha < \beta \quad r\alpha^2 + \beta^2 = 12 \rightarrow \alpha^2 + \beta^2 + r\alpha^2 = 12 \Rightarrow r\alpha^2 = m - r \quad \varepsilon$$

$$S = \varepsilon$$

$$P = \frac{m+r}{r}$$

$$rx^2 - \lambda x + m + r = 0 \Rightarrow x = \frac{\lambda \pm \sqrt{\lambda^2 - 4r(m+r)}}{2r} = \frac{\lambda \pm r\sqrt{12-rm-r}}{2r}$$

$$\alpha, \beta = \frac{r \pm \sqrt{12-rm}}{r} \Rightarrow \alpha^2 = \frac{r(12-rm) - \lambda^2 \pm 2\lambda r\sqrt{12-rm}}{r^2}$$

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$$r\alpha^2 = 12 - m - r\sqrt{12-rm}$$

$$\Rightarrow m - r = 12 - m - r\sqrt{12-rm} \Rightarrow 12 - rm = r\sqrt{12-rm} \Rightarrow rm^2 - 4\epsilon m + 2\delta r = 12r - 4rm$$

$$rm^2 - 4r + 4\epsilon = 0 \rightarrow m^2 - 4m + 12 = 0$$

$$(m-2)^2 = 0 \Rightarrow m = 2 \quad \checkmark$$

$$\Rightarrow \alpha, \beta \rightarrow \alpha = 1, \beta = 3$$

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$$y = a(x-h)^2 + k \rightarrow y = a(x-r)^2 + a = ax^2 - 2ax + ra + a \quad (2) \quad -\delta$$

$$ra + a = \delta \rightarrow a = -1$$

$$-x^2 + 4x + \delta = (-x + \delta)(x + 1)$$

$$\begin{matrix} -1 & \delta \\ - & + \\ | & | \\ 0 & 0 \end{matrix} \quad \checkmark$$

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$$S = \frac{-b}{a} = \frac{V}{\alpha} = \alpha + \beta$$

(P) -4

$$P = \frac{C}{\alpha} = \frac{q\beta}{\alpha} = \alpha\beta \rightarrow \frac{q}{\alpha} = \alpha \Rightarrow \alpha^2 = q \Rightarrow \alpha = \pm \sqrt{q}$$

$$S = \begin{cases} \frac{V}{r} = \alpha + \beta \Rightarrow \beta = \frac{r}{\alpha} \\ \frac{-V}{r} = -\alpha + \beta \Rightarrow \beta = \frac{r}{\alpha} \end{cases}$$

$$\frac{1}{\alpha} + \frac{1}{\beta} = \frac{1}{r} + \frac{r}{r} = \frac{V}{q} \checkmark$$

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$$S = \alpha + \beta = \frac{-b}{a} = -m, \quad P = -r = \frac{C}{a}$$

(P) -V

$$\alpha^2 - m\beta = 1 \rightarrow \alpha^2 + (\alpha + \beta)(\beta) = 1 \Rightarrow (\alpha^2 + \beta^2) + \alpha\beta = 1$$

$$S^2 - rP + P = 1 \Rightarrow S^2 - P = 0$$

$$m^2 + r = 1 \rightarrow (m-r)(m+r) = 0 \quad \begin{cases} -2 < \alpha < 2 \\ r \Rightarrow S = -r \checkmark \end{cases}$$

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$$f(x) = mx^2 + rx + \frac{m}{r} + v$$

(P) -A

$$S = \frac{\frac{-b}{2a}}{\frac{-b}{2a}} \rightarrow \frac{-14 + rm^2 + rm}{rm} = 1 \Rightarrow rm^2 + rm - 14 = rm \rightarrow rm^2 - rm - 14 = 0$$

$$m^2 - rm - 14 = 0 \rightarrow (m-7)(m+2) = 0$$

$$\begin{matrix} m=7 & \leftarrow r \\ m=-2 & \leftarrow r \end{matrix}$$

$$15 \quad f(x) = -rx^2 + rx + 4 \rightarrow rx^2 - rx - 4 = 0 \Rightarrow \alpha^2 - r\alpha - \frac{4}{r} = 0 \quad \begin{cases} -1 \\ r = k = x_r \checkmark \end{cases}$$

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

$$x=0 \rightarrow y = ka + 4 = 8 \Rightarrow a = \frac{-1}{r}$$

(P)

$$y = \frac{-1}{r}(x^2 - rx + r) + 4 = \frac{-1}{r}x^2 + rx - r + 4 = \frac{-1}{r}x^2 + rx + 8$$

$$\begin{matrix} S = 8 \\ P = \frac{r}{r} \end{matrix}$$

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$$\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha + \beta}{\alpha\beta} = \frac{-1}{r} \checkmark$$

$$x^2 - (ra + r)x + (ra^2 + 4a + r) = 0 \xrightarrow{x_1=r} r - 1a - 1 + ra^2 + 4a + r = 0$$

(P) -1.

$$ra^2 - ra - 1 = 0 \quad \begin{cases} a=1 = x^2 - 1x + 1 \rightarrow r, 4 \checkmark \\ a = \frac{-1}{r} = x^2 - \frac{1}{r}x + \frac{r}{r} \rightarrow r, \frac{r}{r} \checkmark \end{cases}$$

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$$\Delta > 0 \rightarrow 14(a+1)^2 - 12(a+1)^2 > 0 \rightarrow 2(a+1)^2 > 0$$

$$a \neq -1$$

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