

$$\textcircled{1} \quad \left. \begin{array}{l} x+y=1 \\ 2x^2-y^2=2 \end{array} \right\} \begin{array}{l} y=1-x \\ 2x^2-(1-x)^2=2 \\ 2x^2-(1+x^2-2x)=2 \rightarrow \end{array}$$

$$\rightarrow 2x^2-1-x^2+2x-2=0$$

$$x^2+2x-3=0 \rightarrow x = \frac{-2 \pm \sqrt{4-4 \cdot 1 \cdot (-3)}}{2 \cdot 1}$$

$$x = \frac{-2 \pm \sqrt{4+12}}{2} = \frac{-2 \pm \sqrt{16}}{2} = \frac{-2 \pm 4}{2}$$

$$x_1 = \frac{-2+4}{2} = 1 \quad x_2 = \frac{-2-4}{2} = -3$$

$$\boxed{\begin{array}{l} x_1 = 1 \\ x_2 = -3 \end{array}}$$

$$\textcircled{2} \quad (x-1)^2 + (x+2)^2 > \frac{(2x-3)^2}{2}$$

$$x^2+1-2x+x^2+4+4x > \frac{4x^2+9-12x}{2}$$

$$\frac{\cancel{2x^2} + \cancel{2x^2} + 2 - 4x + 8 + 8x}{2} > \frac{\cancel{4x^2} + 9 - 12x}{2}$$

$$-4x + 8x + 12x > 9 - 2 - 8$$

$$16x > -1 \quad x > \frac{-1}{16}$$

$$(2x+1)^2 - (x-3)^2 < 3(x+2)^2$$

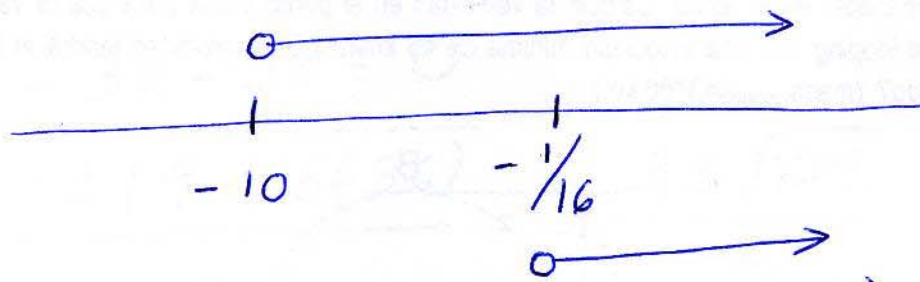
$$4x^2+1+4x-x^2-9+6x < 3(x^2+4+4x)$$

$$4x^2+1+4x-x^2-9+6x < 3x^2+12+12x$$

$$\cancel{4x^2} - \cancel{x^2} - \cancel{3x^2} + 4x + 6x - 12x < 12 + 9 - 1$$

$$-2x < 20$$

$$x > \frac{20}{-2} \Rightarrow x > -10$$



Soluc $(-\frac{1}{16}, \infty)$

$$\textcircled{4} \left. \begin{aligned} \log_2 x + \log_2 y &= 3 \\ \log_2 x - \log_2 y &= 1 \end{aligned} \right\}$$

$$\log_2 (x \cdot y) = \log_2 8$$

$$\log_2 \frac{x}{y} = \log_2 2$$

$$\left. \begin{aligned} x \cdot y &= 8 \\ \frac{x}{y} &= 2 \end{aligned} \right\} \rightarrow \begin{aligned} 2y \cdot y &= 8 \\ y^2 &= 4 \end{aligned} \quad y = \pm \sqrt{4}$$

$y_1 = 2$	$y_2 = -2$
$x_1 = 4$	$x_2 = -4$

$$\textcircled{5} \log (3x+7) = 2 \log (x+1) - \log (2x-5)$$

$$\log (3x+7) = \log (x+1)^2 - \log (2x-5)$$

$$\log (3x+7) = \log \frac{(x+1)^2}{(2x-5)}$$

$$(3x+7) = \frac{(x+1)^2}{(2x-5)} \Rightarrow (3x+7) \cdot (2x-5) = (x+1)^2$$

$$a) 6x^2 - 15x + 14x - 35 = x^2 + 1 + 2x$$

$$6x^2 - x^2 + 14x - 15x - 2x - 35 - 1 = 0$$

$$5x^2 - 3x - 36 = 0$$

$$x = \frac{3 \pm \sqrt{9 - 4 \cdot 5(-36)}}{2 \cdot 5} = \frac{3 \pm \sqrt{729}}{10} = \frac{3 \pm 27}{10}$$

$$x_1 = \frac{3+27}{10} = 3 \quad x_2 = \frac{3-27}{10} = \frac{-24}{10} = -\frac{12}{5}$$

$$b) 2 \cdot \log(2x+3) = 0 \quad \log(2x+3)^2 = \log 1$$

$$(2x+3)^2 = 1 \rightarrow 4x^2 + 9 + 12x = 1$$

$$4x^2 + 12x + 9 - 1 = 0 \rightarrow 4x^2 + 12x + 8 = 0$$

$$x = \frac{-12 \pm \sqrt{12^2 - 4 \cdot 4 \cdot 8}}{2 \cdot 4} = \frac{-12 \pm \sqrt{16}}{8} = \frac{-12 \pm 4}{8}$$

$$x_1 = \frac{-12+4}{8} = \frac{-8}{8} = -1 \quad x_2 = \frac{-12-4}{8} = -2$$

$$⑥ \quad 5^{x+1} + 5^{x-1} + 5^{x-1} = \frac{31}{5} \quad z = 5^x$$

$$5 \cdot z + z + \frac{z}{5} = \frac{31}{5} \Rightarrow \frac{25z + 5z + z}{5} = \frac{31}{5}$$

$$31z = 31 \Rightarrow z = 1 \quad 5^x = 1 \quad \boxed{x=0}$$

$$\textcircled{7} \begin{cases} 5x + 2y + 3z = 6 \\ 4x - 3y + 2z = 9 \\ 3x + 5y - 6z = -8 \end{cases}$$

$$12x - 9y + 6z = 27$$

$$3x + 5y - 6z = -8$$

$$15x - 4y = 19$$

$$15x - 4y = 19$$

$$2x - 13y = 15$$

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$$195x - 52y = 247$$

$$-8x + 52y = -60$$

$$187x = 187$$

$$x = \frac{187}{187} = 1$$

$$5x + 2y + 3z = 6$$

$$5 \cdot 1 + 2(-1) + 3 \cdot 2 = 6 \rightarrow$$

$$3z = 6 - 5 + 2$$

$$3z = 3$$

$$\boxed{z = 1}$$

$$-10x - 4y - 6z = -12$$

$$12x - 9y + 6z = 27$$

$$2x - 13y = 15$$

$$30x - 8y = 38$$

$$-30x + 195y = -225$$

$$187y = -187$$

$$\boxed{y = -1}$$

$$\boxed{x = 1}$$