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7. Resuelve las siguientes ecuaciones exponenciales:

a) $3^{x^2-5} = 81$

c) $4^x + 4^{x+2} = 272$

e) $5^x = 193$

a) $3^{x^2-5} = 81$

$$3^{x^2-5} = 3^4$$

$$x^2 - 5 = 4$$

$$x^2 = 9$$

$$x = \sqrt{9} = \pm 3$$

Soluciones: $x_1 = 3, x_2 = -3$

c) $4^x + 4^{x+2} = 272$

$$4^x + 4^x \cdot 4^2 = 272$$

$$4^x + 16 \cdot 4^x = 272$$

$$17 \cdot 4^x = 272$$

$$4^x = \frac{272}{17}$$

$$4^x = 16$$

$$x = 2$$

Solución: $x = 2$

e) $5^x = 193$

$$\log 5^x = \log 193$$

$$x \cdot \log 5 = \log 193$$

$$x = \frac{\log 193}{\log 5} \approx 3,27$$

Solución: $x = 3,27$

b) $2^{x+1} = \sqrt[3]{4}$

d) $2^x + 2^{x+3} = 36$

f) $2^{x^2-2} = 835$

b) $2^{x+1} = \sqrt[3]{4}$

$$2^{x+1} = 2^{2/3}$$

$$x + 1 = \frac{2}{3}$$

$$x = -\frac{1}{3}$$

Solución: $x = -\frac{1}{3}$

d) $2^x + 2^{x+3} = 36$

$$2^x + 2^x \cdot 2^3 = 36$$

$$2^x + 8 \cdot 2^x = 36$$

$$9 \cdot 2^x = 36$$

$$2^x = \frac{36}{9}$$

$$2^x = 4$$

$$x = 2$$

Solución: $x = 2$

f) $2^{x^2-2} = 835$

$$\log (2^{x^2-2}) = \log 835$$

$$(x^2 - 2) \cdot \log 2 = \log 835$$

$$x^2 - 2 = \frac{\log 835}{\log 2}$$

$$x^2 = \frac{\log 835}{\log 2} + 2$$

$$x = \pm \sqrt{\frac{\log 835}{\log 2} + 2} \approx \pm 3,42$$

Soluciones: $x_1 \approx 3,42; x_2 \approx -3,42$

8. Aplica la definición de logaritmo para calcular x en cada caso:

a) $\log_2 (2x - 1) = 3$

c) $\log 4x = 2$

e) $\log (3x + 1) = -1$

a) $\log_2 (2x - 1) = 3$

$$2^3 = 2x - 1$$

$$8 + 1 = 2x$$

$$x = \frac{9}{2}$$

Solución: $x = \frac{9}{2}$

c) $\log 4x = 2$

$$10^2 = 4x$$

$$100 = 4x$$

$$x = 25$$

Solución: $x = 25$

e) $\log (3x + 1) = -1$

$$10^{-1} = 3x + 1$$

$$\frac{1}{10} = 3x + 1$$

$$x = \frac{-3}{10}$$

Solución: $x = \frac{-3}{10}$

b) $\log_2 (x + 3) = -1$

d) $\log (x - 2) = 2,5$

f) $\log_2 (x^2 - 8) = 0$

b) $\log_2 (x + 3) = -1$

$$2^{-1} = x + 3$$

$$\frac{1}{2} = x + 3$$

$$x = \frac{-5}{2}$$

Solución: $x = \frac{-5}{2}$

d) $\log (x - 2) = 2,5$

$$10^{2,5} = x - 2$$

$$10^{5/2} = x - 2$$

$$\sqrt{10^5} + 2 = x$$

$$x = 2 + 100\sqrt{10}$$

Solución: $x = 2 + 100\sqrt{10}$

f) $\log_2 (x^2 - 8) = 0$

$$2^0 = x^2 - 8$$

$$1 + 8 = x^2$$

$$9 = x^2$$

$$x = \pm\sqrt{9} = \pm 3$$

Soluciones: $x_1 = 3, x_2 = -3$

9. Resuelve las siguientes ecuaciones exponenciales:

a) $2^{x+1} = \sqrt{8}$

b) $\sqrt{3^x} = 17$

c) $10^{1-x^2} = 0,001$

d) $81\left(\frac{1}{3}\right)^x = 3^{x+2}$

a) $2^{x+1} = \sqrt{8} \rightarrow 2^{x+1} = 2^{3/2} \rightarrow x+1 = \frac{3}{2} \rightarrow x = \frac{1}{2}$

Solución: $x = \frac{1}{2}$

b) $\sqrt{3^x} = 17 \rightarrow 3^{x/2} = 17 \rightarrow \log 3^{x/2} = \log 17 \rightarrow \frac{x}{2} \cdot \log 3 = \log 17 \rightarrow$
 $\rightarrow x = \frac{\log 17}{\log 3} \cdot 2 \rightarrow x \approx 5,16$

Solución: $x \approx 5,16$

c) $10^{1-x^2} = 0,001 \rightarrow 10^{1-x^2} = 10^{-3} \rightarrow 1-x^2 = -3 \rightarrow x = \sqrt{4} \rightarrow x = \pm 2$

Soluciones: $x_1 = 2, x_2 = -2$

d) $81 \cdot \left(\frac{1}{3}\right)^x = 3^{x+2} \rightarrow 81 \cdot (3^{-1})^x = 3^x \cdot 3^2 \rightarrow 81 \cdot (3^x)^{-1} = 9 \cdot 3^x \rightarrow \frac{81}{9} = (3^x)^2 \rightarrow$
 $\rightarrow 9 = 3^{2x} \rightarrow 3^2 = 3^{2x} \rightarrow x = 1$

Solución: $x = 1$

10. Resuelve.

a) $3 \cdot 5^x + 5^{x+1} = 200$

b) $7 \cdot 2^{x-1} - 5 \cdot 2^x = -\frac{3}{4}$

c) $2 \cdot 3^{x+1} + 3^{x-1} - 5 \cdot 3^x = 108$

d) $2^{x-1} + 2^{x-2} + 2^{x-3} = 224$

a) $3 \cdot 5^x + 5^{x+1} = 200 \rightarrow 3 \cdot 5^x + 5^x \cdot 5 = 200 \rightarrow 8 \cdot 5^x = 200 \rightarrow 5^x = \frac{200}{8} = 25 \rightarrow$
 $\rightarrow 5^x = 5^2 \rightarrow x = 2$

Solución: $x = 2$

b) $7 \cdot 2^{x-1} - 5 \cdot 2^x = -\frac{3}{4} \rightarrow 7 \cdot 2^x \cdot 2^{-1} - 5 \cdot 2^x = -\frac{3}{4} \rightarrow \frac{7}{2} \cdot 2^x - 5 \cdot 2^x = -\frac{3}{4} \rightarrow$
 $\rightarrow -\frac{3}{2} \cdot 2^x = -\frac{3}{4} \rightarrow 2^x = \frac{1}{2} \rightarrow 2^x = 2^{-1} \rightarrow x = -1$

Solución: $x = -1$

c) $2 \cdot 3^{x+1} + 3^{x-1} - 5 \cdot 3^x = 108 \rightarrow 2 \cdot 3^x \cdot 3 + \frac{3^x}{3} - 5 \cdot 3^x = 108 \rightarrow$
 $\rightarrow \frac{18 \cdot 3^x + 3^x - 15 \cdot 3^x}{3} = 108 \rightarrow \frac{4 \cdot 3^x}{3} = 108 \rightarrow$
 $\rightarrow 3^x = 81 = 3^4 \rightarrow x = 4$

Solución: $x = 4$

d) $2^{x-1} + 2^{x-2} + 2^{x-3} = 224 \rightarrow 2^x \cdot 2^{-1} + 2^x \cdot 2^{-2} + 2^x \cdot 2^{-3} = 224 \rightarrow$
 $\rightarrow \frac{4 \cdot 2^x + 2 \cdot 2^x + 2^x}{8} = 224 \rightarrow \frac{7 \cdot 2^x}{8} = 224 \rightarrow$
 $\rightarrow 2^x = 256 = 2^8 \rightarrow x = 8$

Solución: $x = 8$

18.  Resuelve.

$$\text{a) } \begin{cases} x - y + 3 = 0 \\ x^2 + y^2 = 5 \end{cases}$$

$$\text{b) } \begin{cases} x + y = 1 \\ xy + 2y = 2 \end{cases}$$

$$\text{c) } \begin{cases} 2x + y = 3 \\ xy - y^2 = 0 \end{cases}$$

$$\text{d) } \begin{cases} 3x + 2y = 0 \\ x(x - y) = 2y^2 - 8 \end{cases}$$

$$\text{a) } \begin{cases} x = y - 3 \\ (y - 3)^2 + y^2 = 5 \rightarrow y^2 - 6y + 9 + y^2 - 5 = 0 \rightarrow 2y^2 - 6y + 4 = 0 \end{cases}$$

$$y^2 - 3y + 2 = 0 \rightarrow y = \frac{3 \pm \sqrt{1}}{2} = \begin{cases} y_1 = 1 \rightarrow x_1 = 1 - 3 = -2 \\ y_2 = 2 \rightarrow x_2 = 2 - 3 = -1 \end{cases}$$

Soluciones: $x_1 = -2, y_1 = 1; x_2 = -1, y_2 = 2$

$$\text{b) } \begin{cases} x = 1 - y \\ (1 - y)y + 2y = 2 \rightarrow y - y^2 + 2y = 2 \rightarrow y^2 - 3y + 2 = 0 \end{cases}$$

$$y = \frac{3 \pm 1}{2} = \begin{cases} y_1 = 1 \rightarrow x_1 = 1 - 1 = 0 \\ y_2 = 2 \rightarrow x_2 = 1 - 2 = -1 \end{cases}$$

Soluciones: $x_1 = 0, y_1 = 1; x_2 = -1, y_2 = 2$

$$\text{c) } \begin{cases} y = 3 - 2x \\ x(3 - 2x) - (3 - 2x)^2 = 0 \rightarrow 3x - 2x^2 - 9 - 4x^2 - 12x = 0 \end{cases}$$

$$-6x^2 + 15x - 9 = 0 \rightarrow 2x^2 - 5x + 3 = 0 \rightarrow x = \frac{5 \pm 1}{2} = \begin{cases} x_1 = 2 \\ x_2 = 3 \end{cases}$$

Si $x_1 = 2 \rightarrow y_1 = 3 - 4 = -1$

Si $x_2 = 3 \rightarrow y_2 = 3 - 6 = -3$

Soluciones: $x_1 = 2, y_1 = -1; x_2 = 3, y_2 = -3$

$$\text{d) } \begin{cases} y = -\frac{3}{2}x \\ x\left(x + \frac{3}{2}x\right) = 2\left(-\frac{3}{2}x\right)^2 - 8 \rightarrow \frac{5}{2}x^2 = \frac{9}{2}x^2 - 8 \rightarrow -2x^2 = -8 \end{cases}$$

$$x^2 = 4 \begin{cases} x_1 = 2 \rightarrow y_1 = -\frac{3}{2} \cdot 2 = -3 \\ x_2 = -2 \rightarrow y_2 = -\frac{3}{2}(-2) = 3 \end{cases}$$

Soluciones: $x_1 = 2, y_1 = -3; x_2 = -2, y_2 = 3$

19.  Resuelve los siguientes sistemas de ecuaciones:

$$\text{a) } \begin{cases} x^2 + y^2 = 41 \\ x^2 - y^2 = 9 \end{cases}$$

$$\text{b) } \begin{cases} 3x^2 + 2y^2 = 35 \\ x^2 - 2y^2 = 1 \end{cases}$$

$$\text{c) } \begin{cases} x^2 + y^2 + x + y = 32 \\ x^2 - y^2 + x - y = 28 \end{cases}$$

$$\text{d) } \begin{cases} x^2 + 2y^2 + x + 1 = 0 \\ x^2 - 2y^2 + 3x + 1 = 0 \end{cases}$$

$$\text{a) } \begin{cases} x^2 + y^2 = 41 \\ x^2 - y^2 = 9 \end{cases}$$

$$\frac{2x^2}{\quad} = 50 \rightarrow x^2 = 25 \rightarrow x = \pm 5$$

$$\text{Si } x = 5 \rightarrow 25 + y^2 = 41 \rightarrow y^2 = 16 \rightarrow y = \pm 4$$

$$\text{Si } x = -5 \rightarrow 25 + y^2 = 41 \rightarrow y^2 = 16 \rightarrow y = \pm 4$$

$$\text{Soluciones: } x_1 = 5, y_1 = 4; x_2 = 5, y_2 = -4; x_3 = -5, y_3 = 4; x_4 = -5, y_4 = -4$$

$$\text{b) } \begin{cases} 3x^2 + 2y^2 = 35 \\ x^2 - 2y^2 = 1 \end{cases}$$

$$\frac{4x^2}{\quad} = 36 \rightarrow x^2 = 9 \rightarrow x = \pm 3$$

$$\text{Si } x = 3 \rightarrow 27 + 2y^2 = 35 \rightarrow y^2 = 4 \rightarrow y = \pm 2$$

$$\text{Si } x = -3 \rightarrow 27 + 2y^2 = 35 \rightarrow y^2 = 4 \rightarrow y = \pm 2$$

$$\text{Soluciones: } x_1 = 3, y_1 = 2; x_2 = 3, y_2 = -2; x_3 = -3, y_3 = 2; x_4 = -3, y_4 = -2$$

$$\text{c) } \begin{cases} x^2 + y^2 + x + y = 32 \\ x^2 - y^2 + x - y = 28 \end{cases}$$

$$\frac{2x^2 + 2x}{\quad} = 60 \rightarrow x^2 + x = 30 \rightarrow x^2 + x - 30 = 0$$

$$x = \frac{-1 \pm \sqrt{1+120}}{2} = \frac{-1 \pm 11}{2} = \begin{cases} -6 \\ 5 \end{cases}$$

$$\bullet \text{ Si } x = -6 \rightarrow 36 + y^2 - 6 + y = 32 \rightarrow y^2 + y - 2 = 0$$

$$y = \frac{-1 \pm \sqrt{1+8}}{2} = \frac{-1 \pm 3}{2} = \begin{cases} -2 \\ 1 \end{cases}$$

$$\bullet \text{ Si } x = 5 \rightarrow 25 + y^2 + 5 + y = 32 \rightarrow y^2 + y - 2 = 0 \rightarrow y = \begin{cases} -2 \\ 1 \end{cases}$$

$$\text{Soluciones: } x_1 = -6, y_1 = -2; x_2 = -6, y_2 = 1; x_3 = 5, y_3 = -2; x_4 = 5, y_4 = 1$$

$$\text{d) } \begin{cases} x^2 + 2y^2 + x + 1 = 0 \\ x^2 - 2y^2 + 3x + 1 = 0 \end{cases}$$

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

$$\text{Si } x = -1 \rightarrow 1 + 2y^2 - 1 + 1 = 0 \rightarrow 2y^2 = -1 \rightarrow \text{No tiene solución.}$$

20.  Resuelve y comprueba las soluciones.

$$\text{a) } \begin{cases} x + y = 2 \\ \frac{1}{x} + \frac{1}{y} = -\frac{2}{3} \end{cases}$$

$$\text{b) } \begin{cases} \frac{1}{x} + \frac{1}{y} = \frac{1}{20} \\ x + 2y = 3 \end{cases}$$

$$\text{c) } \begin{cases} y^2 - 2y + 1 = x \\ \sqrt{x} + y = 5 \end{cases}$$

$$\text{d) } \begin{cases} 2\sqrt{x+1} = y + 1 \\ 2x - 3y = 1 \end{cases}$$

$$\text{a) } \begin{cases} y = 2 - x \\ 3y + 3x = -2xy \end{cases} \quad \begin{cases} y = 2 - x \\ 3(2 - x) + 3x = -2x(2 - x) \end{cases}$$

$$6 - 3x + 3x = -4x + 2x^2 \rightarrow 2x^2 - 4x - 6 = 0 \rightarrow x^2 - 2x - 3 = 0$$

$$x = \frac{2 \pm 4}{2} \begin{cases} x_1 = -1 \rightarrow y_1 = 2 + 1 = 3 \\ x_2 = 3 \rightarrow y_2 = 2 - 3 = -1 \end{cases}$$

Soluciones: $x_1 = -1, y_1 = 3; x_2 = 3, y_2 = -1$

$$\text{b) } \begin{cases} 20y + 20x = xy \\ x = 3 - 2y \end{cases} \rightarrow 20y + 20(3 - 2y) = (3 - 2y)y$$

$$20y + 60 - 40y = 3y - 2y^2 \rightarrow 2y^2 - 23y + 60 = 0 \rightarrow y = \frac{23 \pm 7}{4} \begin{cases} y_1 = 4 \\ y_2 = 15/2 \end{cases}$$

Si $y = 4 \rightarrow x = 3 - 8 = -5$

Si $y = \frac{15}{2} \rightarrow x = 3 - 2 \cdot \frac{15}{2} = -12$

Soluciones: $x_1 = -5, y_1 = 4; x_2 = -12, y_2 = \frac{15}{2}$

$$\text{c) } \begin{cases} y^2 - 2y + 1 = x \\ \sqrt{x} + y = 5 \end{cases} \rightarrow \sqrt{y^2 - 2y + 1} + y = 5 \rightarrow \sqrt{(y-1)^2} + y = 5 \rightarrow$$

$$\rightarrow 2y = 6 \rightarrow y = 3 \rightarrow x = 9 - 6 + 1 = 4$$

Solución: $x = 4, y = 3$

$$\text{d) } \begin{cases} 2\sqrt{x+1} = y + 1 \\ 2x - 3y = 1 \end{cases} \rightarrow y = \frac{2x-1}{3}$$

$$2\sqrt{x+1} = \frac{2x-1}{3} + 1 \rightarrow 2\sqrt{x+1} = \frac{2x-1+3}{3} \rightarrow (2\sqrt{x+1})^2 = \left(\frac{2x+2}{3}\right)^2 \rightarrow$$

$$\rightarrow 4(x+1) = \frac{4x^2+8x+4}{9} \rightarrow 36x+36 = 4x^2+8x+4 \rightarrow$$

$$\rightarrow 4x^2 - 28x - 32 = 0 \rightarrow x^2 - 7x - 8 = 0 \rightarrow x = \frac{7 \pm 9}{2} \begin{cases} x_1 = -1 \\ x_2 = 8 \end{cases}$$

Si $x = -1 \rightarrow y = -1$

Si $x = 8 \rightarrow y = \frac{16-1}{3} = 5$

Soluciones: $x_1 = -1, y_1 = -1; x_2 = 8, y_2 = 5$

21.  Resuelve.

$$\text{a) } \begin{cases} xy = 15 \\ x^2 + y^2 = 34 \end{cases}$$

$$\text{b) } \begin{cases} xy = 12 \\ x^2 - 5y^2 = 16 \end{cases}$$

$$\text{c) } \begin{cases} xy = 4 \\ (x + y)^2 = 25 \end{cases}$$

$$\text{d) } \begin{cases} x^2 + y^2 = \frac{82}{9} \\ xy = -1 \end{cases}$$

$$\text{a) } \begin{cases} y = \frac{15}{x} \\ x^2 + \left(\frac{15}{x}\right)^2 = 34 \rightarrow x^4 + 225 = 34x^2 \end{cases}$$

Hacemos el cambio $x^2 = z \rightarrow z^2 - 34z + 225 = 0 \rightarrow z = \frac{34 \pm 16}{2} = \begin{cases} 25 \\ 9 \end{cases}$

Si $z = 25 \begin{cases} x = 5 \rightarrow y = 3 \\ x = -5 \rightarrow y = -3 \end{cases}$

Si $z = 9 \begin{cases} x = 3 \rightarrow y = 5 \\ x = -3 \rightarrow y = -5 \end{cases}$

Soluciones: $x_1 = 5, y_1 = 3; x_2 = -5, y_2 = -3; x_3 = 3, y_3 = 5; x_4 = -3, y_4 = -5$

$$\text{b) } \begin{cases} y = \frac{12}{x} \\ x^2 - 5\left(\frac{12}{x}\right)^2 = 16 \rightarrow x^2 - \frac{720}{x^2} = 16 \rightarrow x^4 - 16x^2 - 720 = 0 \end{cases}$$

Cambio $x^2 = z \rightarrow z^2 - 16z - 720 = 0 \rightarrow z = \frac{16 \pm 56}{2} = \begin{cases} 36 \\ -20 \text{ (no vale)} \end{cases}$

Si $z = 36 \begin{cases} x = 6 \rightarrow y = 2 \\ x = -6 \rightarrow y = -2 \end{cases}$

Soluciones: $x_1 = 6, y_1 = 2; x_2 = -6, y_2 = -2$

$$\text{c) } \begin{cases} y = \frac{4}{x} \\ \left(x + \frac{4}{x}\right)^2 = 25 \rightarrow \left(\frac{x^2 + 4}{x}\right)^2 = 25 \rightarrow x^4 + 8x^2 + 16 = 25x^2 \rightarrow x^4 - 17x^2 + 16 = 0 \end{cases}$$

Hacemos el cambio $x^2 = z$:

$$z^2 - 17z + 16 = 0 \rightarrow z = \frac{17 \pm \sqrt{17^2 - 64}}{2} = \frac{17 \pm 15}{2} = \begin{cases} 16 \\ 1 \end{cases}$$

Si $z = 16 \begin{cases} x = 4 \rightarrow y = 1 \\ x = -4 \rightarrow y = -1 \end{cases}$

Si $z = 1 \begin{cases} x = 1 \rightarrow y = 4 \\ x = -1 \rightarrow y = -4 \end{cases}$

Soluciones: $x_1 = 4, y_1 = 1; x_2 = -4, y_2 = -1; x_3 = 1, y_3 = 4; x_4 = -1, y_4 = -4$

$$d) \begin{cases} x^2 + \left(-\frac{1}{x}\right)^2 = \frac{82}{9} \rightarrow x^4 + 1 - \frac{82}{9}x^2 = 0 \rightarrow 9x^4 - 82x^2 + 9 = 0 \\ y = \frac{1}{x} \end{cases}$$

Cambio $x^2 = z \rightarrow 9z^2 - 82z + 9 = 0 \rightarrow z = \frac{82 \pm \sqrt{6724 - 324}}{18} = \frac{82 \pm 80}{18} = \begin{cases} 9 \\ 1/9 \end{cases}$

Si $z = 9 \begin{cases} x = 3 \rightarrow y = -1/3 \\ x = -3 \rightarrow y = 1/3 \end{cases}$

Si $z = \frac{1}{9} \begin{cases} x = 1/3 \rightarrow y = -3 \\ x = -1/3 \rightarrow y = 3 \end{cases}$

Soluciones: $x_1 = 3, y_1 = -\frac{1}{3}; x_2 = -3, y_2 = \frac{1}{3}; x_3 = \frac{1}{3}, y_3 = -3; x_4 = -\frac{1}{3}, y_4 = 3$

22. Resuelve.

a) $\begin{cases} x - y = 1 \\ 2^x - 2^y = 4 \end{cases}$ b) $\begin{cases} \log x + \log y = 1 \\ x - y = 9 \end{cases}$ c) $\begin{cases} 2^{x+1} - y = 0 \\ 2^x + y = 12 \end{cases}$ d) $\begin{cases} \log x - \log y = 1 \\ x + y = 22 \end{cases}$

a) $\begin{cases} x - y = 1 \rightarrow x = 1 + y \\ 2^x - 2^y = 4 \end{cases}$

$2^{1+y} - 2^y = 4 \rightarrow 2 \cdot 2^y - 2^y = 4 \rightarrow 2^y = 4 \rightarrow 2^y = 2^2 \rightarrow y = 2$

Si $y = 2 \rightarrow x = 1 + 2 = 3$

Solución: $x = 3, y = 2$

b) $\begin{cases} \log x + \log y = 1 \\ x - y = 9 \end{cases} \rightarrow \begin{cases} xy = 10 \\ x - y = 9 \end{cases} \rightarrow \begin{cases} xy = 10 \\ x = 9 + y \end{cases} \rightarrow$
 $\rightarrow (9 + y)y = 10 \rightarrow 9y + y^2 = 10 \rightarrow y^2 + 9y - 10 = 0 \rightarrow$
 $\rightarrow y = \frac{-9 \pm \sqrt{81 + 40}}{2} = \frac{-9 \pm \sqrt{121}}{2} \begin{cases} y = 1 \\ y = -10, \text{ no vale} \end{cases}$

Si $y = 1 \rightarrow x = 9 + 1 = 10$

Solución: $x = 10, y = 1$

c) $\begin{cases} 2^{x+1} - y = 0 \\ 2^x + y = 12 \end{cases} \rightarrow \begin{cases} 2 \cdot 2^x - y = 0 \\ 2^x + y = 12 \end{cases}$
 $\frac{3 \cdot 2^x}{3 \cdot 2^x} = 12 \rightarrow 2^x = \frac{12}{3} = 4 \rightarrow x = 2$

Si $x = 2 \rightarrow 2^{2+1} - y = 0 \rightarrow y = 2^3 = 8$

Solución: $x = 2, y = 8$

d) $\begin{cases} \log x - \log y = 1 \\ x + y = 22 \end{cases} \rightarrow \begin{cases} \log\left(\frac{x}{y}\right) = 1 \\ x + y = 22 \end{cases} \rightarrow \begin{cases} 10^1 = \frac{x}{y} \\ x + y = 22 \end{cases} \rightarrow$

$\rightarrow x = 10y \rightarrow 10y + y = 22 \rightarrow 11y = 22 \rightarrow y = 2$

$x = 10 \cdot 2 = 20$

Solución: $x = 20, y = 2$