ECUACIÓN EXPONENCIAL

• Marco teórico

Son aquellas ecuaciones que presentan la incógnita en el exponente.

Ejemplo:

$$3^{\boxed{x}+8} = 81 \quad \text{Incógnita}$$

Teorema 1:

$$a^x = a^y \Rightarrow x = y \,; a \neq 0$$
$$a \neq 1$$

◗ $2^{6x} = 2^{24}$
$$= \rightarrow 6x = 24$$
$$x = 4$$

◗ $3^{\frac{x}{2}-8} = 1$

Solución

$$3^{\frac{x}{2}-8} = 3^0 \qquad \text{¡Es importante lograr bases iguales!}$$

$$\frac{x}{2} - 8 = 0$$

$$\frac{x}{2} = 8 \qquad x = 16$$

◗ $5^{2x} = 125$

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

$$2x = 3$$

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

Teorema 2:

$$x^x = y^y \Rightarrow x = y \,; x, y \neq 0$$

◗ $x^x = 6^6 \rightarrow x = 6$

◗ $(a+4)^{(a+4)} = 27$

Solución

$$(a+4)^{(a+4)} = 3^3$$
$$a + 4 = 3$$
$$a = -1$$

Teorema 3

$$a \neq b \,; a^x = b^x \rightarrow x = 0$$

◗ $2^{x+5} = 3^{x+5} \rightarrow x + 5 = 0$
$$x = -5$$

◗ $7^{a-3} = 5^{b+8}$

Solución:

$$a - 3 = 0 \rightarrow a = 3$$
$$b + 8 = 0 \rightarrow b = -8$$

Teorema 4

$$x^{x^{\cdot^{\cdot^{\cdot^{x^n}}}}} = n \rightarrow x = \sqrt[n]{n}$$

◗ $x^{x^{\cdot^{\cdot^{\cdot^{x^5}}}}} = 5 \rightarrow x = \sqrt[5]{5}$

Integral

1. Resuelve:

$$2^{x+9}=2^{13}$$

2. Resuelve:

$$a^a=27$$

3. Resuelve:

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

PUCP

4. Resuelve:

$$2^{2x-5}=8$$

Resolución:

$$2^{2x-5}=8$$

$$\underbrace{2^{2x-5}=2^3}\quad \text{¡Hay que lograr bases iguales!}$$

$$2x-5=3$$
$$2x=8$$
$$x=8/2$$
$$x=4$$

5. Resuelve:

$$3^{3x-14}=81$$

6. Resuelve:

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

7. Resuelve:

$$3^{4x+3}=1$$

UNMSM

8. Calcula "a":

$$16^{3-a}=32^{a-1}$$

Recuerda:
$$16=2^4$$
$$32=2^5$$

Resolución:

$$16^{3-a}=32^{a-1}$$

$$\left(2^4\right)^{3-a}=\left(2^5\right)^{a-1}$$

$$12-4a=4a-5$$
$$12+5=5a+4a$$
$$17=9a$$
$$17/9=a$$

9. Calcula: "x"

$$81^{x+2}=9^{x-8}$$

10. Calcula: x – 4

$$\left(x+1\right)^{\left(x+1\right)}=7^7$$

11. Calcula: "x"

$$x^{x^{\cdot^{\cdot^{x^5}}}}=5$$

UNI

12. Calcula: n

$$3^{n+1}\cdot 9^{n+2}=27^{3-n}\cdot 814^{\cdot n}$$

Resolución:
Recordemos
$$9=3^2$$
$$27=3^3$$
$$81=3^4$$

$$3^{n+1}\cdot\left(3^2\right)^{n+2}=\left(3^3\right)^{3-n}\cdot\left(3^4\right)^{4-n}$$

$$3^{n+1}\cdot 3^{2n+4}=3^{9-3n}\cdot 3^{16-4n}$$

$$3^{n+1+2n+4}=3^{9-3n+16-4n}$$

$$3^{3n+5}=3^{25-7n}$$

$$3n+5=25-7n$$
$$3n+7n=25-5$$
$$10n=20$$
$$n=2$$

13. Resuelve:

$$2^{x+2}\cdot 4^{x+3}=8^{4-x}\cdot 16^{5-x}$$

14. Resuelve:

$$27^{\frac{x-2}{3}}=81$$