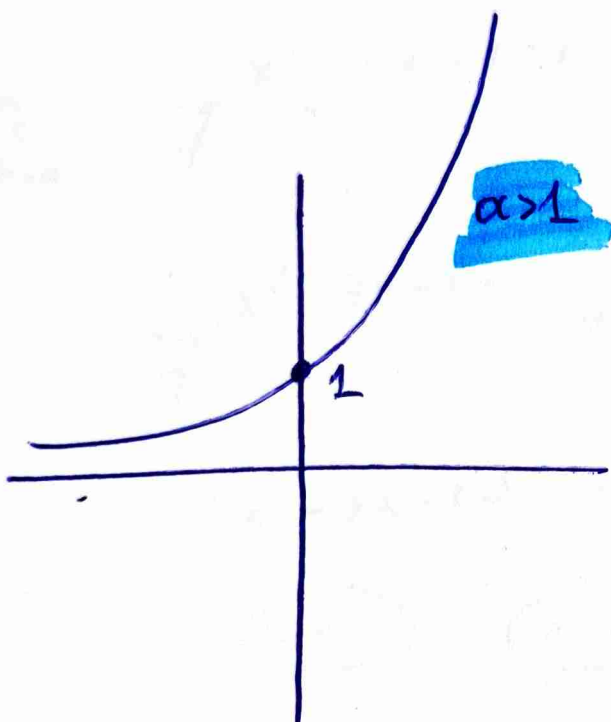
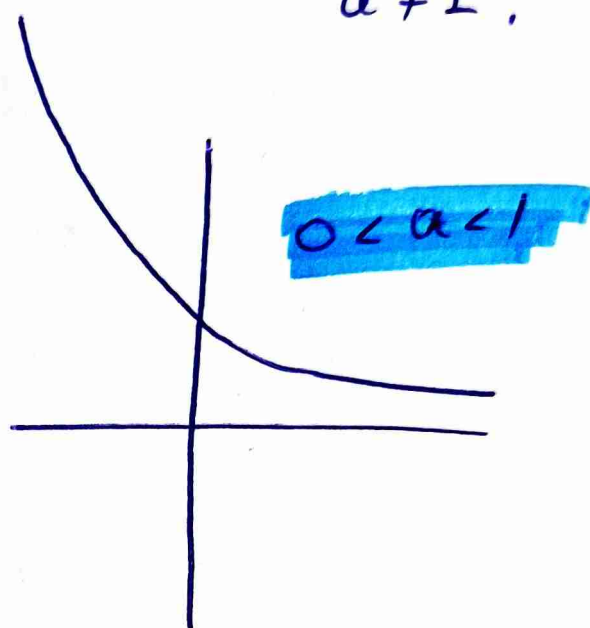


Εκθετική Συναρτηση

$$f(x) = a^x, \quad \begin{array}{l} a > 0 \\ x \in \mathbb{R} \\ a \neq 1 \end{array}$$



- $D_f = \mathbb{R}$
- $f \nearrow$
- $\Sigma T_f = (0, +\infty)$



- $D_f = \mathbb{R}$
- $f \searrow$
- $\Sigma T_f = (0, +\infty)$

$$a^x > 0$$

$$a^x > 0$$

Εκθετικά Εξισώσεις

1. $2^x = 32$

$$\Leftrightarrow 2^x = 2^5 \quad \Leftrightarrow \underline{\underline{x = 5}}$$

2. $7^{x^2-3x-10} = 1$

$$7^{x^2-3x-10} = 7^0$$

$$x^2 - 3x - 10 = 0$$

$$(x=5)$$

$$(x=-2)$$

3. $9^{|x|-5} = \frac{1}{27}$

$$(3^2)^{|x|-5} = \frac{1}{3^3}$$

$$\Leftrightarrow 3^{2|x|-10} = 3^{-3}$$

$$2|x| - 10 = -3$$

$$2|x| = 7$$

$$|x| = \frac{7}{2}$$

$$(x = \pm \frac{7}{2})$$

4. $5^{x+3} + 25 = 0$
 $5^{x+3} = -25$
 Answer.

5. $13^{x-1} = 0$
 Answer.

6. $3^{8-|x|} = 9^{|x|-2}$
 $3^{8-|x|} = (3^2)^{|x|-2}$
 $3^{8-|x|} = 3^{2|x|-4}$

$$8-|x| = 2|x|-4$$

$$12 = 3|x|$$

$$|x| = 4$$

$$x = \pm 4$$

7.

$$8^{x^2-x} = 4^{x^2+2}$$

$$(2^3)^{x^2-x} = (2^2)^{x^2+2}$$

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

$$3x^2-3x = 2x^2+4$$

$$x^2-3x-4=0$$

$$x=4$$

$$x=-1$$

8. $\left(\frac{1}{4}\right)^{x+5} = \sqrt{2}^{x-4}$

$$\left(\frac{1}{2}\right)^{2x+10} = \left(2^{\frac{1}{2}}\right)^{x-4}$$

$$2^{-2x-10} = 2^{\frac{x-4}{2}}$$

$$-2x-10 = \frac{x-4}{2}$$

$$-4x-20 = x-4$$

$$-5x = 16$$

$$x = -\frac{16}{5}$$

$$9. \quad 4^{x+1} - 9 \cdot 2^x + 2 = 0,$$

$$4^x \cdot 4^1 - 9 \cdot 2^x + 2 = 0$$

$$4 \cdot (2^x)^2 - 9 \cdot 2^x + 2 = 0$$

$$(2^x = t)$$

$$4t^2 - 9t + 2 = 0$$

$$\Delta = 81 - 32 = 49$$

$$t = \frac{9 \pm 7}{8}$$

$$t = 2 \Rightarrow 2^x = 2^1 \quad (x=1)$$

$$t = \frac{1}{4} \Rightarrow 2^x = \frac{1}{4}$$

$$2^x = \left(\frac{1}{2}\right)^2$$

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

$$x = -2$$

$$10. \quad 3^x - 7 = \frac{63}{3^{x+1}} - 3^{3-2x}$$

$$3^x - 7 = \frac{63}{3^x \cdot 3^1} - 3^3 \cdot 3^{-2x}$$

$$3^x - 7 = \frac{21}{3^x} - 27 \cdot \frac{1}{3^{2x}}$$

$$3^x - 7 = \frac{21}{3^x} - 27 \cdot \frac{1}{(3^x)^2}$$

$$3^x = t$$

$$t - 7 = \frac{21}{t} - 27 \frac{1}{t^2}$$

$$t^3 - 7t^2 = 21t - 27$$

$$t^3 - 7t^2 - 21t + 27 = 0$$

$$\begin{array}{r} 1 \quad -7 \quad -21 \quad 27 \quad (1) \\ \downarrow \quad 1 \quad -6 \quad -27 \\ \downarrow \quad -6 \quad -27 \quad 0 \end{array}$$

$$(t-1)(t^2-6t-27)=0$$

$$t=1$$

u

$$t=9$$

$$t=-3$$

$$3^x=1$$

$$3^x=9$$

$$3^x=-3$$

$$3^x=3^0$$

$$3^x=3^2$$

Answer

$$x=0$$

$$x=2$$

Ιδιότητα λογαριθμους .

1. $a^x = \theta \quad (\Rightarrow) \quad x = \log_a \theta$
Ο λογαριθμους είναι αριθμους και
αποτελει τη λυση μιας εκθετικης
εξισωσης .

2. $\log_a a^x = x$ π.χ $\log_5 5^6 = 6$

3. $\log_a a = 1$

4. $a^{\log_a x} = x$

Ο, πιο γνωστος λογαριθμους .

$$10^x = \theta \quad (\Rightarrow) \quad x = \log_{10} \theta$$

$$\Rightarrow \boxed{x = \log \theta}$$

$$1. \log 10^x = x$$

$$2. \log 10 = 1$$

$$3. 10^{\log x} = x$$

$$1. \ln e^x = x$$

$$2. e^{\ln x} = x$$

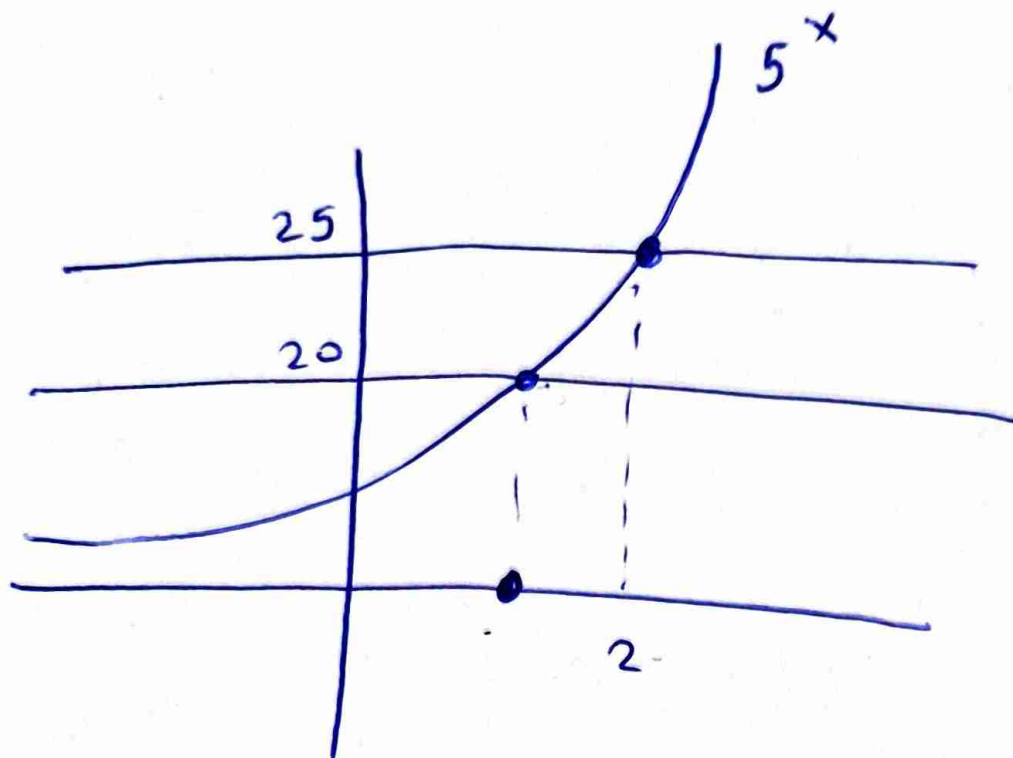
$$3. \ln e = 1$$

Properties of Logarithm.

$$\log_a (\theta_1 \theta_2) = \log_a \theta_1 + \log_a \theta_2$$

$$\log_a \left(\frac{\theta_1}{\theta_2} \right) = \log_a \theta_1 - \log_a \theta_2$$

$$\log_a \theta^k = k \log_a \theta.$$



$$5^x = 25$$

$$5^x = 5^2$$

$$\underline{\underline{x=2}}$$

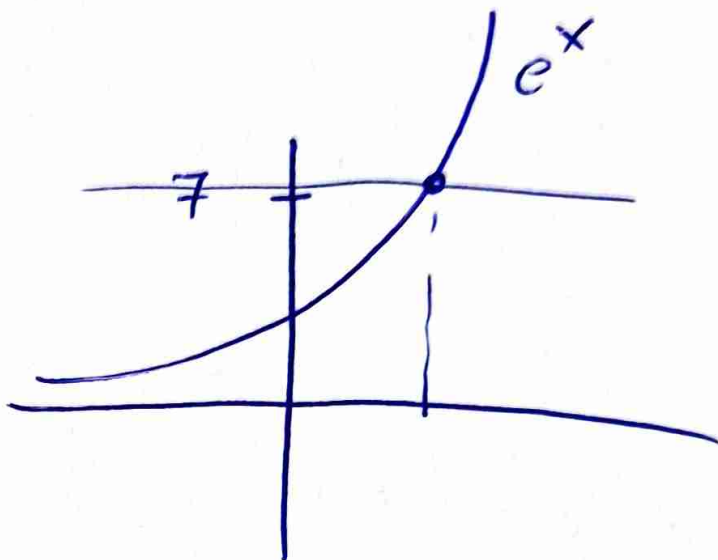
$$5^x = 20$$

$$x = \log_5 20.$$

Το $e \approx 2,7$ νεπεριος αριθμος.

προς τιμη του Euler.

$$\boxed{e^x}$$



$$e^x = 7$$

(=)

$$x = \log_e 7$$

$$\boxed{x = \ln 7}$$

Προσοχη

$\log x$

και

$\ln x$

Διαβρω/
ζοχαριθω,

Εποραιο Μαθημα

23

1

2

3

4

5

6

7

8