Exponential function

Function: $y = a^x$, $a \in R, a > 0, a \neq 1$ is called the exponential function.

- Function $y = a^x$ is everywhere defined $\forall x \in R$
- For x = 0 is $y = a^o = 1$ and function through the point (0,1),
- If $a > 0$ function is increasing
- If $0 < a < 1$ function decrease
- Function $y = a^x$ is always positive
- Basic properties of degree:

$$a^{x+y} = a^x \cdot a^y$$

$$a^{x+y} = \frac{a^x}{a^y}$$

$(a^x)^y = a^{xy}$ where are $a > 0$, $b > 0$, $x, y \in R$

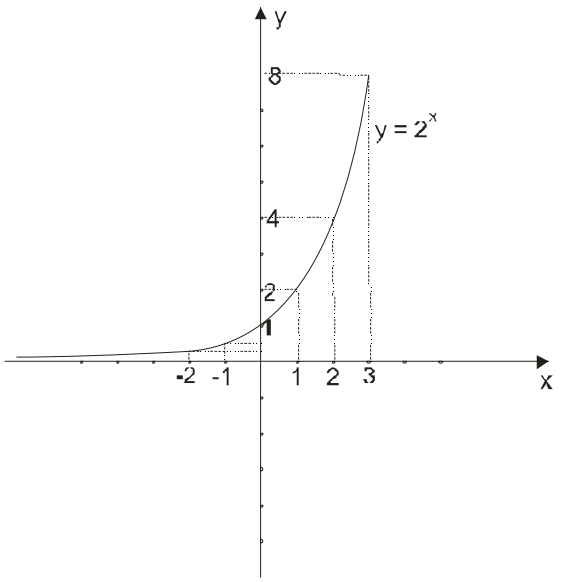
$$(a \cdot b)^x = a^x b^x$$

$$\left(\frac{a}{b}\right)^x = \frac{a^x}{b^x}$$

Example 1. How to draw a graph $y = 2^x$?

Table: take arbitrary values for x, then calculate y

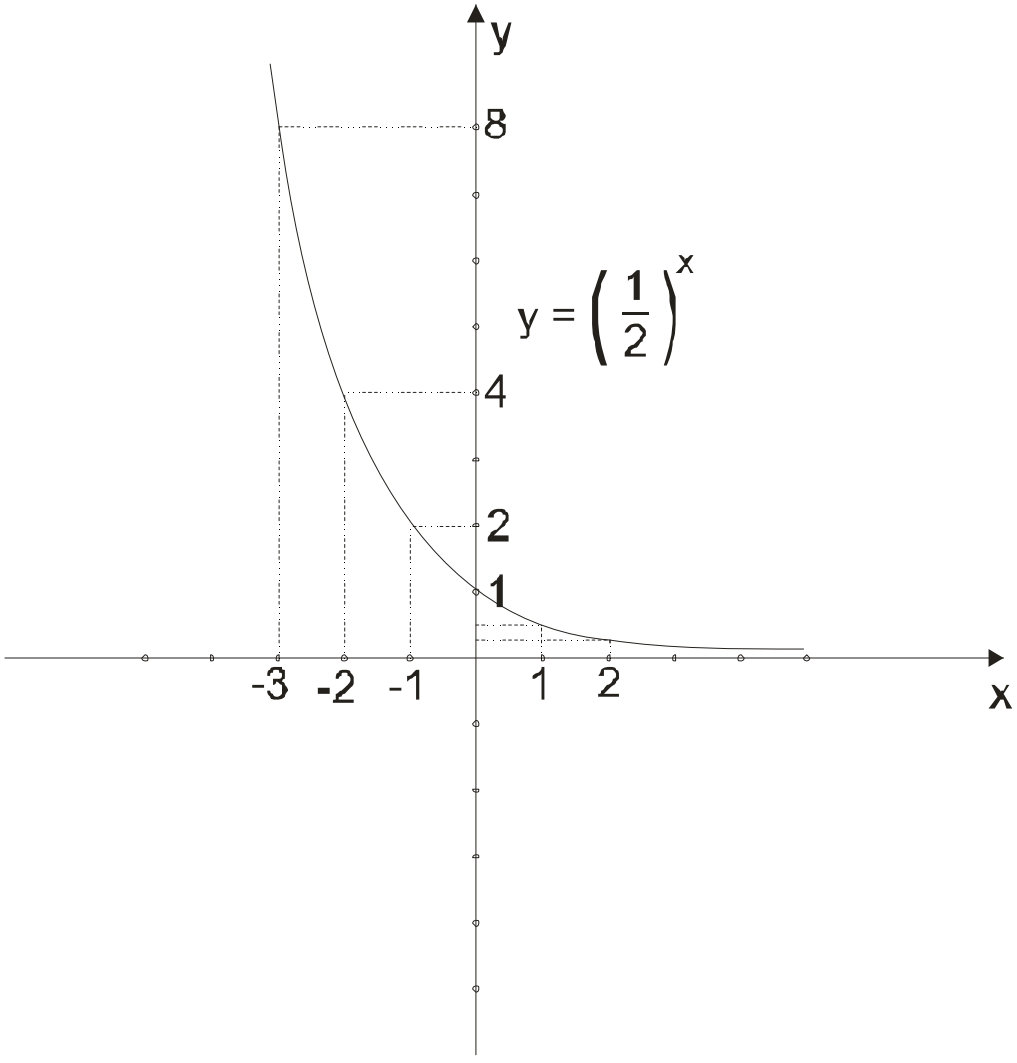
x	-3	-2	-1	0	1	2	3
y	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8



Example 2. How to draw a graph $y=\left(\frac{1}{2}\right)^x$?

$y=\left(\frac{1}{2}\right)^x \rightarrow \boxed{y=2^{-x}}$

x	-3	-2	-1	0	1	2	3
y	8	4	2	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$



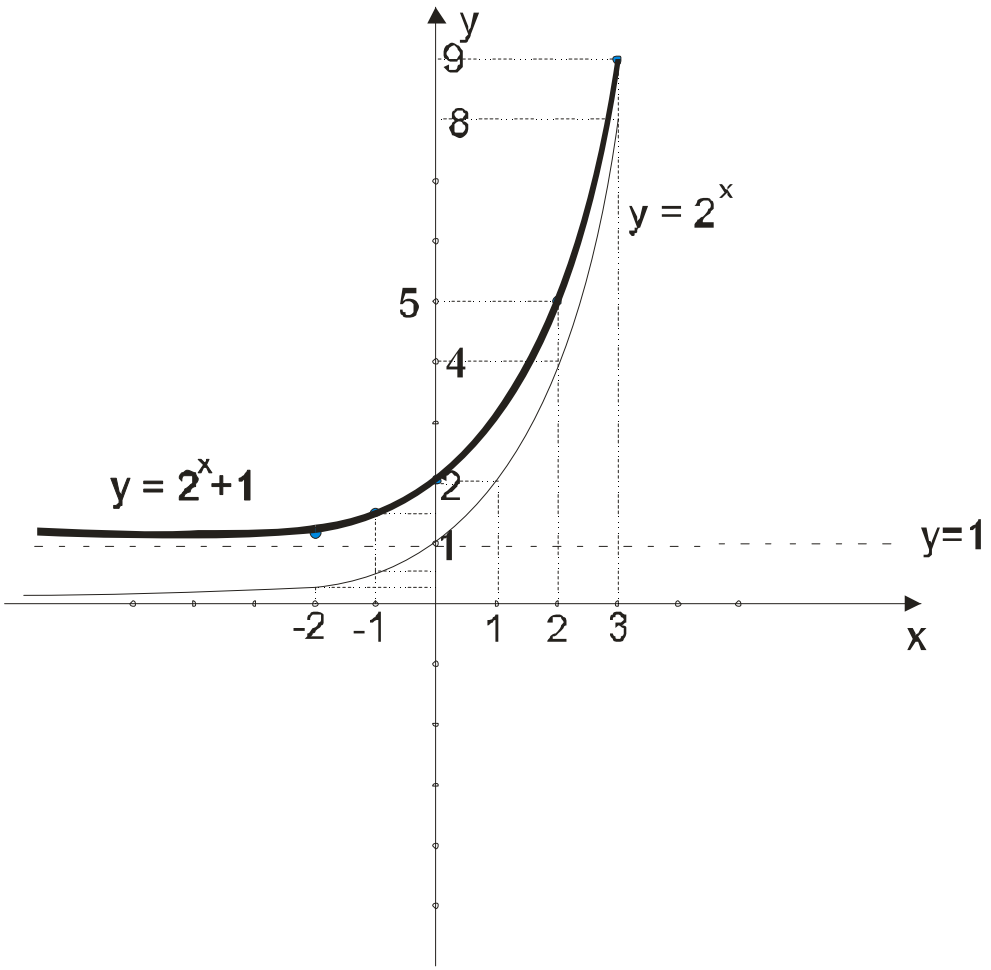
Example 3. $y = 2^x + 1$

And here we can make the table values:

x	-3	-2	-1	0	1	2	3
y	$\frac{9}{8}$	$\frac{5}{4}$	$\frac{3}{2}$	2	3	5	9

But it's easier to think like this:

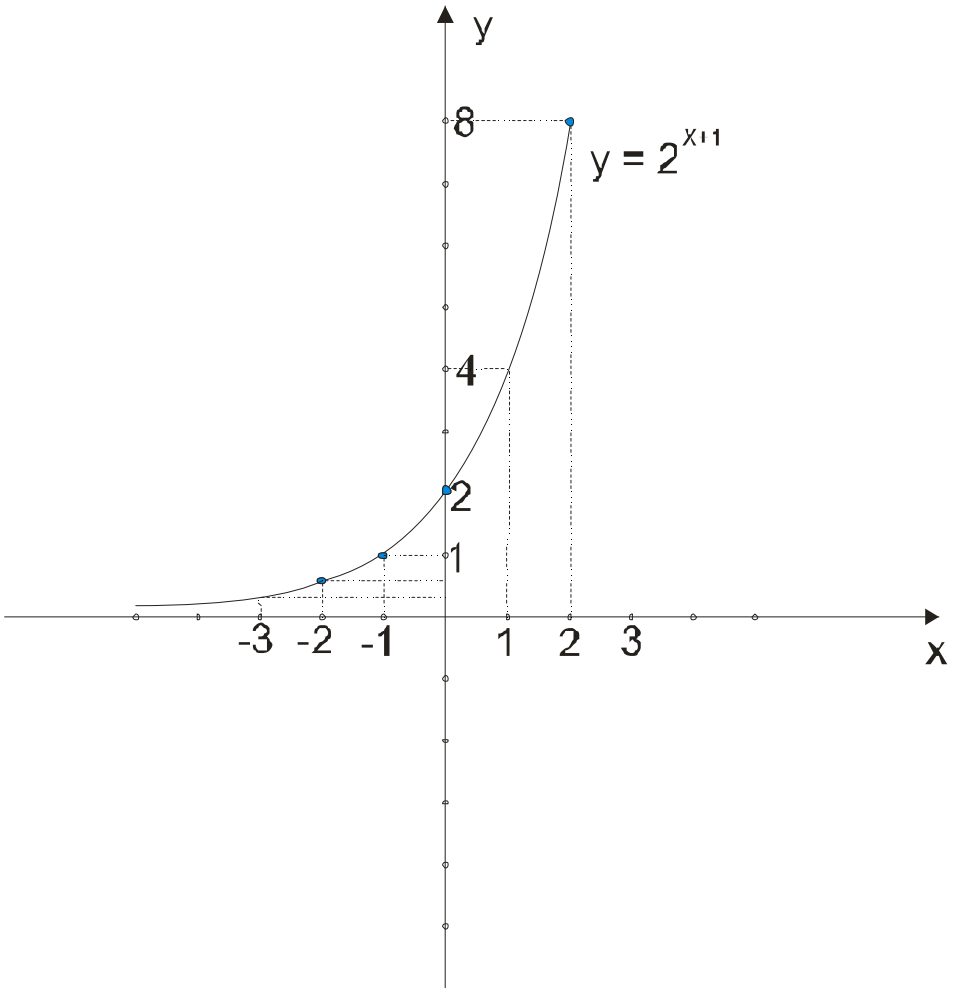
Draft graph $y = 2^x$, and "set up" for one by the y –line:



Example 4. $y = 2^{x+1}$

Take arbitrary values for x, then calculate y....

x	-3	-2	-1	0	1	2	3
y	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8	16



Example 5. $y = 2^{x+|x|}$

The definition of absolute value is $|x| = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$

We must draw two graphs:

$y = 2^{x+|x|}$

$x < 0$

$y = 2^{x-x}$

$y = 2^{0}$

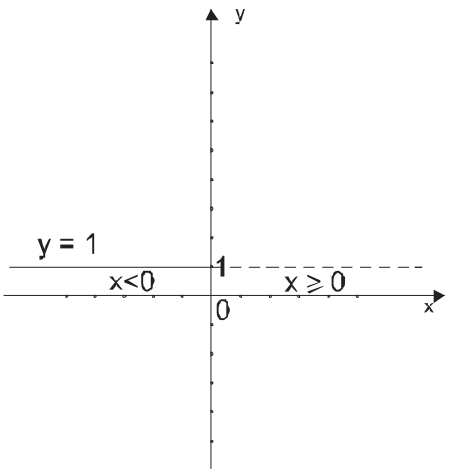
$y = 1$

$x \geq 0$

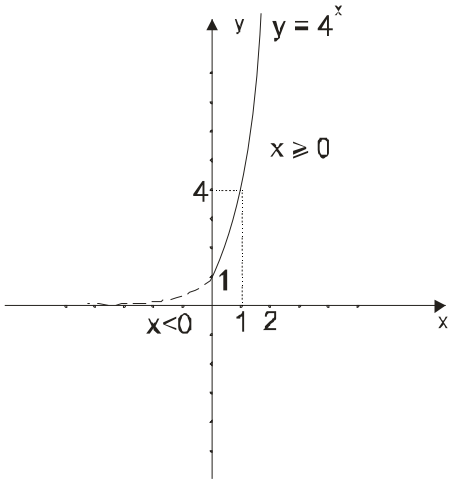
$y = 2^{x+x}$

$y = 2^{2x}$

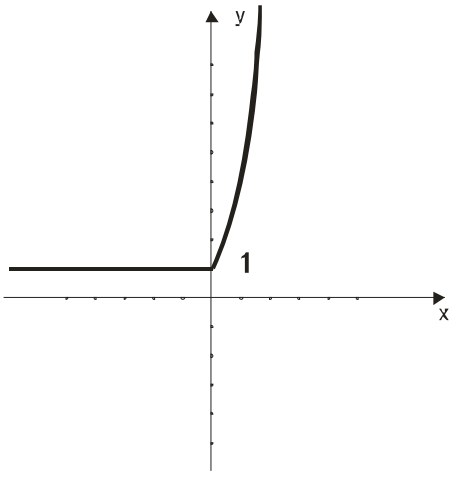
$y = 4^{x}$



slika 1.



slika 2.



slika 3.