

Exponential Functions

Homework:
Page 169-4S: all
Page 170-4T: all

Last week!

$$f(x) = ka^{\lambda x} + c$$

- Exponential Expressions: $2^x \cdot 2^{3x}$
Can you simplify this expression? 2^{4x}

- Exponential Equation:
Can you solve it?

$$2^{4x} = 16 \quad \therefore 4x = 4 \quad \boxed{x=1}$$

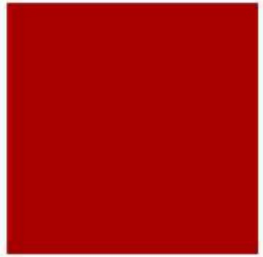
$2^{4x} = 2^4$



From now on...you will solve exponential equations with your GDC!

- Exponential Function: $f(x)$ or $y = 3 \cdot 2^x + 4$
what do you do with functions?

What do you do with functions?

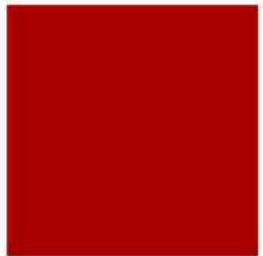


- Graph them, given the equation.
- Find the equation, given the graph or a table
- Evaluate the function (or if you have the x, you can get the y)
- Find the value(s) of x that give a value of the function.
- Table
- Check if a point belongs in the curve.
- Intercepts
 - x-int $\Rightarrow y=0$
 - y-int $\Rightarrow x=0$
- Domain and Range

Explore with Desmos or NSpire

$$f(x) = ka^{\lambda x} + c$$

$$y = 2^x$$



- Is point A(2,8) on this curve?

$8 \stackrel{?}{=} 2^2$ X A is not on this curve

- Evaluate the function when x=2

$f(2) = ?$ or $(2, ?)$ } Answer: substitute the x value
 If it is the same question } $y = 2^2 \rightarrow f(2) = 4$
 $y = 4$ } $(2, 4)$

- What is x, when the value of the function is 16

$f(x) = 16$, solve for x? or $(?, 16)$ } Answer: substitute
 Same question } $16 = 2^x$
 $x = 4$ } $(4, 16)$

- Find the x-intercepts (if any)?

Make $y=0$ } $0 = 2^x$
 No solution } \therefore No x-intercepts

- Find the y-intercept?

Make $x=0$ } $y = 2^0 \rightarrow y = 1 \therefore$ y-int $(0, 1)$

$$f(x) = ka^{\lambda x} + c$$



Domain and Range

- Asymptotes: Recall from Last Unit-domain and Range

Asymptotes are imaginary lines (not part of your curve, hence you always draw it as a dashed line-tac,tac, tac), that represent the value that your functions will NEVER be, or where the function approaches but never gets to it (or intersects)

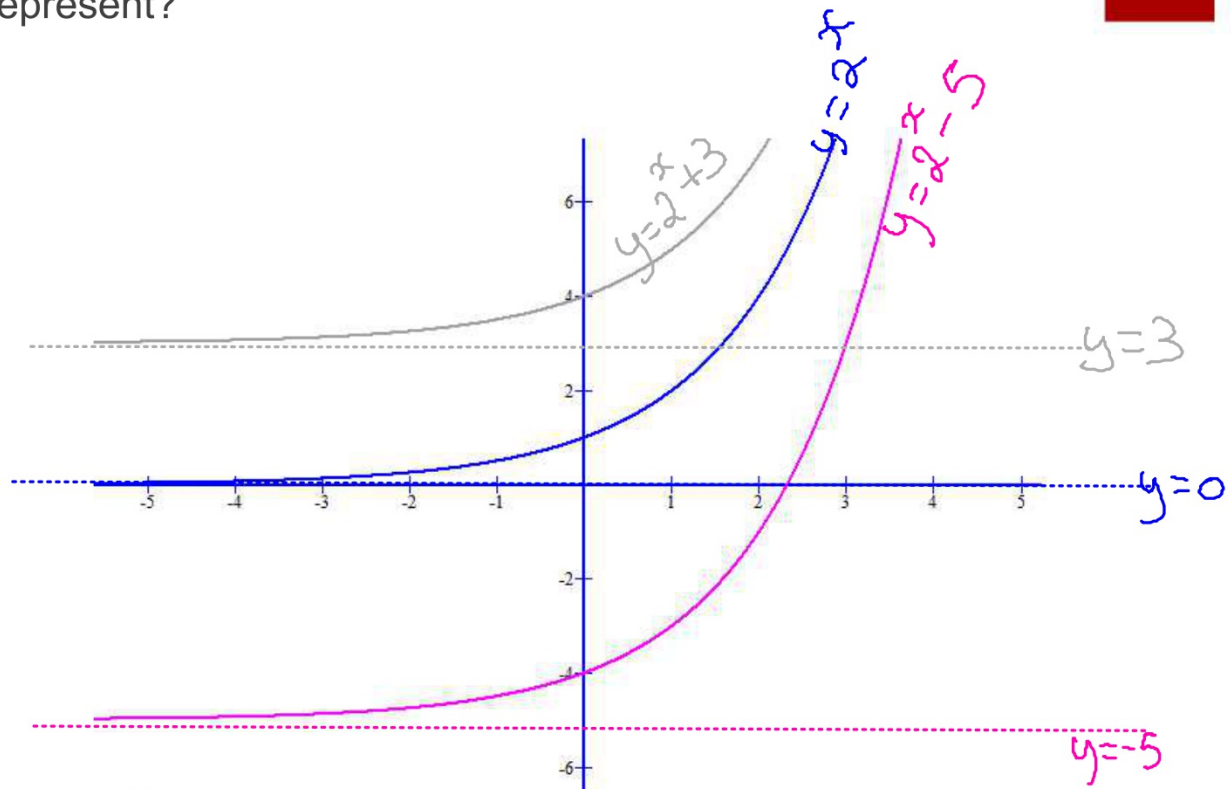
- Horizontal Asymptotes affect your RANGE only.
- Vertical Asymptotes affect your DOMAIN only

Exponential Functions:

- only HORIZONTAL asymptote: you should always give the equation of the asymptote==> $y = \text{"a number"}$
- Your range will always be:
 $\{y \mid y > \text{"the number"}\}$ or $\{y \mid y < \text{"the number"}\}$
 You will never include "the number", so never write \geq or \leq

Investigate: What does the "c" do or represent?

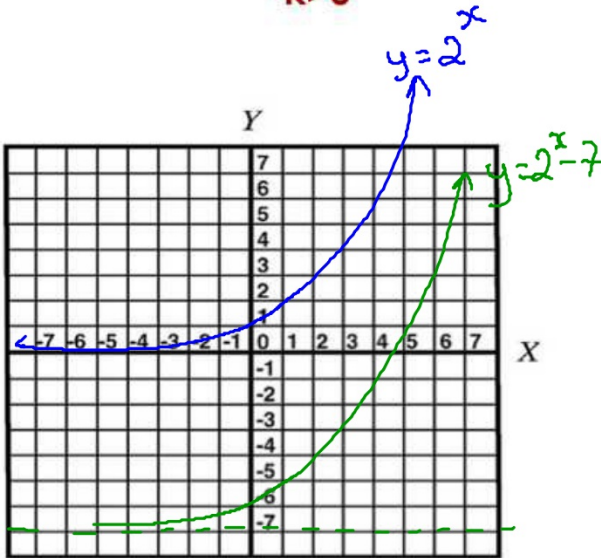
$$y = k \cdot a^{\lambda x} + c$$



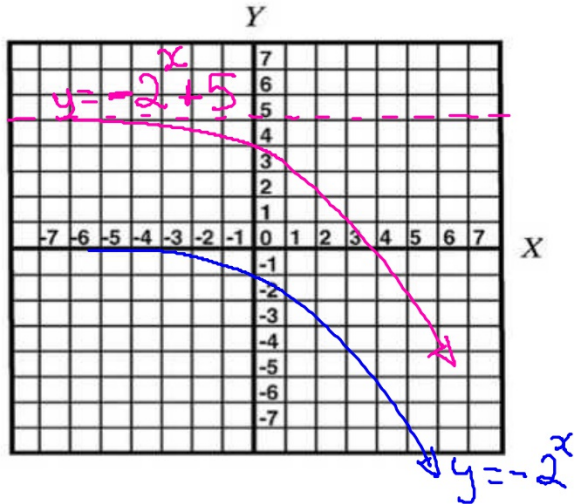
Answer:
the value of the horizontal asymptote

Different Shapes when $\lambda=1 \therefore y=ka^x+c$

$k>0$

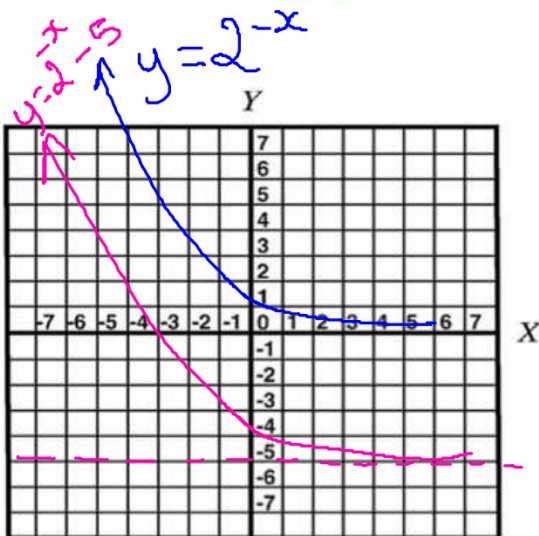


$k<0$



Different Shapes when $\lambda=-1 \therefore y=ka^{-x}+c$

$k>0$



$k<0$

