Warm Up 11/5

$\frac{1}{\frac{1}{2}} = 2$

Evaluate.

1. 3^{-2} $\frac{1}{3^2} = \frac{1}{9}$

2. $-(2^4)$ -16

3. (-2^4) $(-2)^4$ $= (-16)$

4. $5^2 \cdot 5^4 = 5^{2+4} = 5^6$ $25 \cdot 625 = 15625$

5. $\frac{10^8}{10^4} = 10^{8-4} = 10^4 = 10000$

6. 8^{-2} $\frac{1}{64}$

7. $\frac{4^8}{2^8} = \frac{2^8}{4^3}$ $= \frac{2^8 \cdot 2^3}{(2^2)^3} = \frac{2^8}{2^6}$ $= 2^2 = 4$

8. $\left(\frac{2}{5}\right)^2 = \frac{2^2}{5^2} = \frac{4}{25}$

$\frac{4^4}{4^3}$

Lesson 4-1

Exponential Functions

Objective

Students will…

- Be able to define what an exponential function is.
- Be able to evaluate an exponential function at any given value using a calculator.
- Be able to know how to graph an exponential function by hand by making a table of values.

Exponential Functions

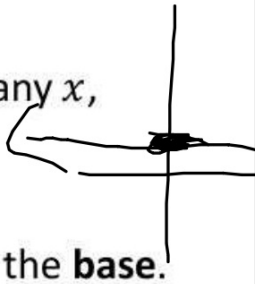
In our previous chapter, we studied polynomial and rational functions. Yet another important and practical function group is the exponential function.

$x^3 + x^2 + \cdots$

The **exponential function** with **base** a is defined for all real numbers by $f(x) = a^x$, where $a > 0$ and $a \neq 1$.

3^x

We assume $a \neq 1$ because the function $f(x) = 1^x = 1$ for any x, which makes it just a constant function.



Also, note that here our **exponent** is the variable, instead of the **base**.

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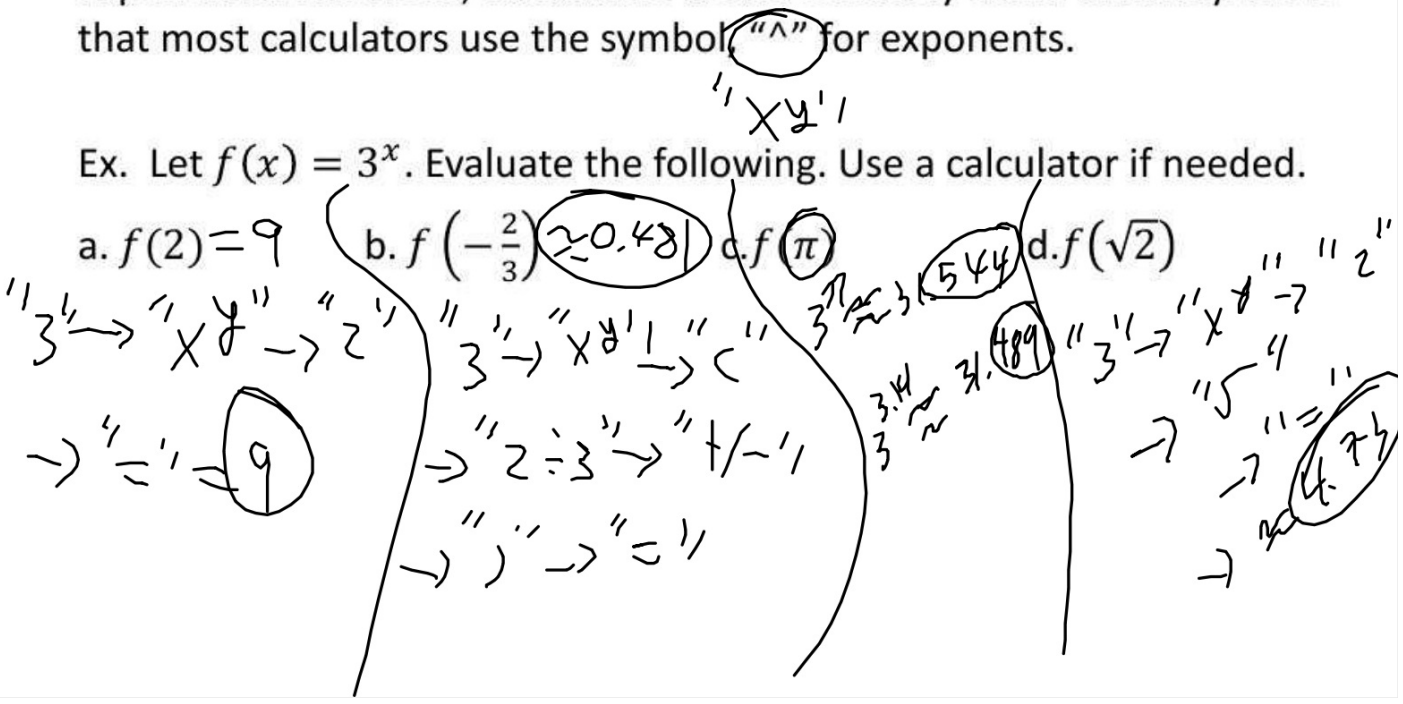
Evaluating Exponential Functions

Evaluating exponential functions follows the same logic as evaluating any kind of a function. You simply "plug" whatever number it is that you are trying to evaluate at for the variable *x*. Now, especially with exponential functions, calculators would seriously come in handy. Note that most calculators use the symbol "^" for exponents.

Ex. Let $f(x) = 3^x$. Evaluate the following. Use a calculator if needed.

a. $f(2) = 9$ b. $f\left(-\frac{2}{3}\right) \approx 0.48$ c. $f(\pi)$ d. $f(\sqrt{2})$



Graphing Exponential Functions

As always, the most basic way to graph any function is by making and using the "x, y" table. Let's graph the following functions. Again, it'd be wise to use a calculator here.

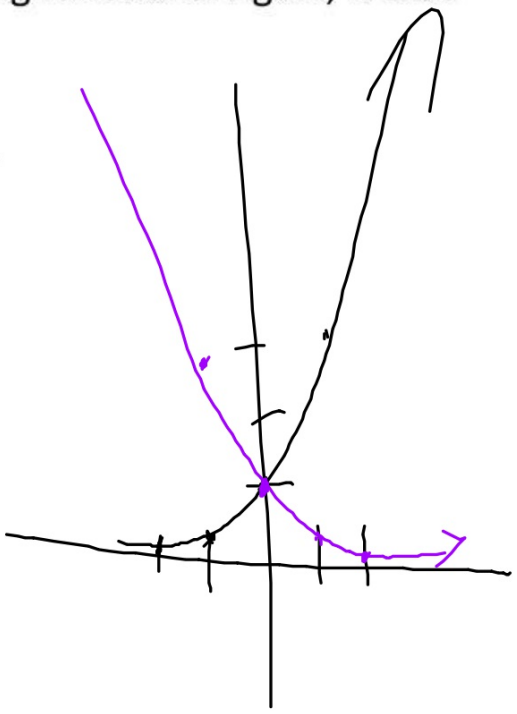
$f(x) = 3^x$

x	f(x)
−2	1/9
−1	1/3
0	1
1	3
2	9

$f(x) = \left(\frac{1}{3}\right)^x = 3^{-x}$

$(1/3)^{-1} = \frac{1}{1/3} = 3$

x	f(x)
−2	9
−1	3
0	1
1	1/3
2	1/9



Homework 11/5

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