$3^{5x-7} = 81 = 3^4$

$$\begin{array}{r|l} 3 & 81 \\ 3 & 27 \\ 3 & 9 \\ & 3 \end{array}$$

$\Longrightarrow$ $5x-7=4$, because exponentials are 1-to-1.

$5 \cdot 5^{2x} = 25^x + 100$

$5 \cdot 5^{2x} = 5^{2x} + 100$

$5 \cdot 5^{2x} - 5^{2x} = 100$

$4 \cdot 5^{2x} = 100$

$5^{2x} = 25 = 5^2$

$2x = 2$

$x = 1$

$25^x = (5^2)^x = 5^{2x}$

5 ☺ $-$ ☺ $=$

$5x - x = 4x$

\$4,000 @ 6% APR, 6 yrs

quarterly → $m = 4$

$$A = P\left(1 + \frac{r}{m}\right)^{mt}$$

$$= 4000\left(1 + \frac{.06}{4}\right)^{4 \cdot 6} \approx \$5718.01$$

```
4000*(1+.06/4)^4
*6
        25472.72522
4000*(1+.06/4)^(
4*6)
        5718.011248
```

→ Hierarchy of operations. This one did the 4^{th} power THEN multiplied by 6. We wanted $4 \cdot 6 = 24$ in the exponent.

Daily: $m = 365$

$$\underline{4000\left(1 + \frac{.06}{365}\right)^{365 \cdot 6}} \approx \boxed{4000e^{.06 \cdot 6}} = \underline{Pe^{rt}}$$

Continuous compounding.

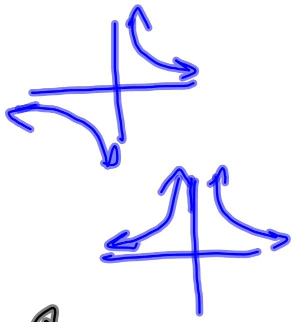
→ $\approx \$5733.15$

→ \$5733.32

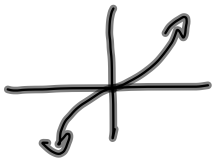
```
4*6)
        5718.011248
4000*(1+.06/365)
^(365*6)
        5733.148035
4000e^(.06*6)
        5733.317658
```

$\frac{1}{x}, \frac{1}{x^3}, \dots$

$\frac{1}{x^2}, \frac{1}{x^4}, \dots$

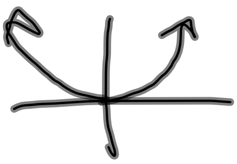


x, x^3, x^5

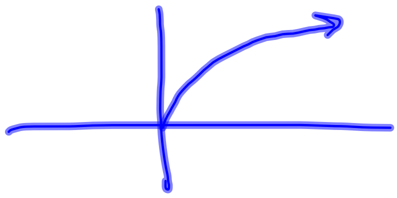


KNOW THIS PAGE.

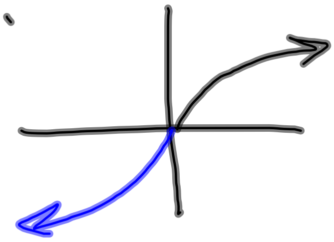
$x^2, x^4, \dots$

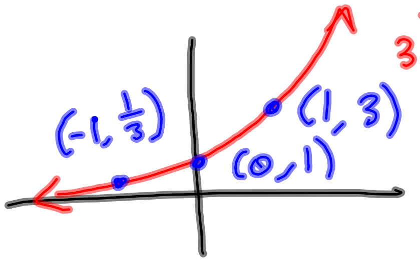


$\sqrt{x} = x^{\frac{1}{2}}, \sqrt[4]{x} = x^{\frac{1}{4}}, \dots$

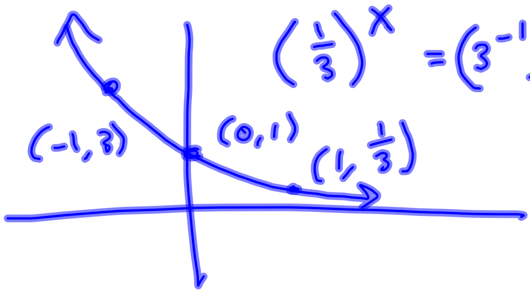


$\sqrt[3]{x} = x^{\frac{1}{3}}, \sqrt[5]{x} = x^{\frac{1}{5}}, \dots$





3^x

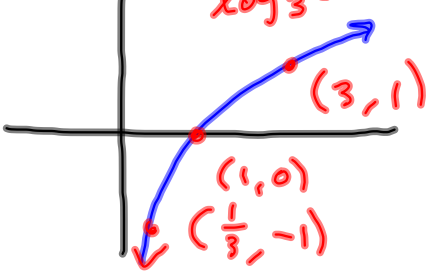


$\left(\frac{1}{3}\right)^x = \left(3^{-1}\right)^x = 3^{-x}$

$b^x,\ b > 1$

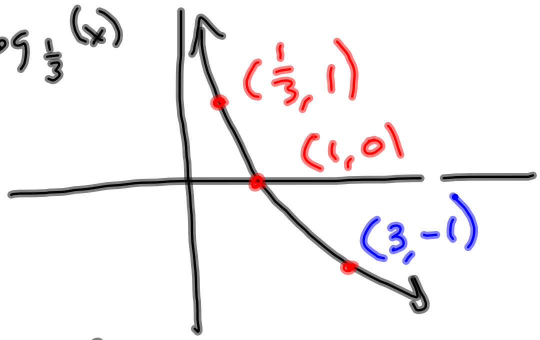
$b^x,\ 0 < b < 1$

$\log_3(x)$



$\log_b(x),\ b > 1$

$\log_{\frac{1}{3}}(x)$



$\log_b(x),\ 0 < b < 1$

$g(x) = 3\log_5(x+4)+11$

Turn this in Monday for one Homework's worth.

$f(x) = \log_5(x)$ ① $\longrightarrow$ ② $\log_5(x+4)$

$f(x+4)$

left 4

$\longrightarrow$ ③ $3\log_5(x+4)$ $\longrightarrow$ ④ $3\log_5(x+4)+11$

$3f(x+4)$

3 times y's

$3f(x+4)+11$

11 plus y's.

WARNING! If you get ③ & ④ backwards, you'll end up graphing

$3\left(\log_5(x+4)+11\right)$ which ain't what we want

Horizontal shrink/stretch & reflect
Horizontal shift
Vertical shrink/stretch & reflect
Vertical shift.

Test 3 Take-Home Due Wed., Oct 26^{th}
Download & print from website.

$3^x = 11$ Exponential Equation

$\therefore$ isolated.

$\log_3(3^x) = \log_3(11)$

$x = \boxed{\log_3(11)} = \dfrac{\log(11)}{\log(3)} = \dfrac{\ln(11)}{\ln(3)}$ Change of Base

This is saying "11 is 3 to the..."

$x = $ ☺?

Derivation:

$x = \log_b(M)$ says $M = b^x$

$\log_c(M) = \log_c(b^x)$

$\log_c(M) = x \cdot \log_c(b)$

$x \cdot \log_c(b) = \log_c(M)$

Change of Base $x = \dfrac{\log_c(M)}{\log_c(b)} = \log_b(M)$

Oct 21-8:25 AM

$3^x = 11$

$\log_3(3^x) = \log_3(11)$

$x = \log_3(11) = \dfrac{\log(11)}{\log(3)}$

Just using $\log_{10}(*)$ to start with.

$3^x = 11$

$\log(3^x) = \log(11)$

$x \log(3) = \log(11)$

$x = \dfrac{\log(11)}{\log(3)}$

Oct 21-8:38 AM

§4.3 Properties of Logarithms

Exponential	Logarithmic
$x^3 \cdot x^6 = x^{3+6} = x^9$	$\ln(3\cdot 6) = \ln(3) + \ln(6)$
$(x^3)^6 = x^{3\cdot 6} = x^{18}$	$\ln(3^6) = 6\ln(3)$
$\dfrac{x^3}{x^6} = x^{3-6} = x^{-3}$	$\ln\left(\frac{3}{6}\right) = \ln(3) - \ln(6)$

$$\begin{array}{r} {}^{4}16 \\ 8 \\ \hline 128 \end{array}$$

$$\log_2(16) = 4$$

$$\log_2\left(\frac{128}{8}\right) = \log_2(128) - \log_2(8)$$
$$= \log_2(2^7) - \log_2(2^3)$$
$$= 7 - 3 = 4$$

$$\begin{array}{l} 2\,\underline{|\,128} \\ 2\,\underline{|\,64} \\ 2\,\underline{|\,32} \\ 2\,\underline{|\,16} \\ 2\,\underline{|\,8} \\ 2\,\underline{|\,4} \\ \quad 2 \end{array}$$

Chapter 3 stuff

Graph $f(x) = (x-1)(x+3)^2(x+1)^3$

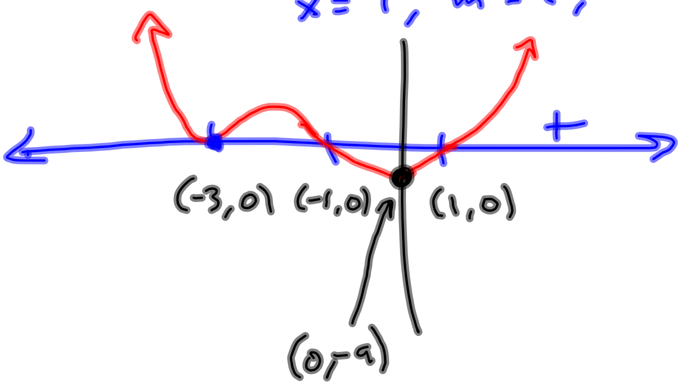
zeros: $x = -3$, $m = 2$, Don't cross

$x = -1$, $m = 3$, cross

$x = 1$, $m = 1$, cross.

Test: $x = 2$

$(2-1)(2+3)^2(2+1)^3$ is positive.



y-int: $f(0) =$

$(-1)(3)^2(1)^3$

$\nexists$ means "does not exist"

$$R(x) = \frac{(x-1)(x+3)^2}{(x+1)^3} = \frac{\boxed{x^3}+5x^2+3x-9}{\boxed{x^3}+3x^2+3x+1}$$

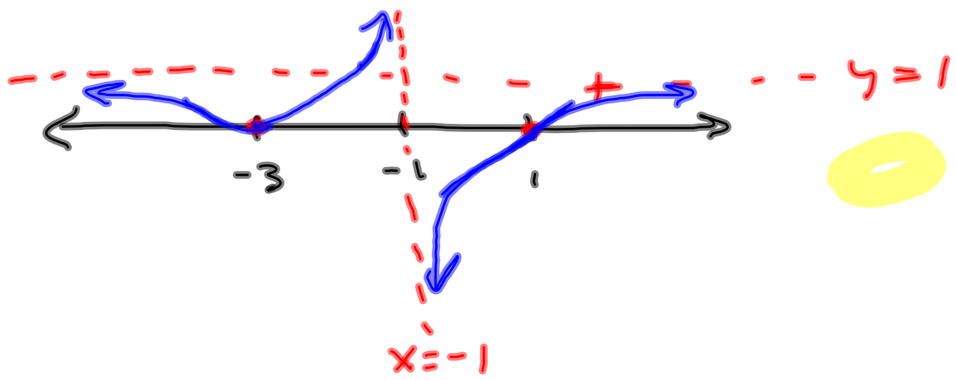
$(x-1)(x^2+6x+9) =$

x^3+6x^2+9x
$-x^2-6x-9$

x^3+5x^2+3x-9

Critical: $x=-3$, zero, $m=2$ Don't cross 1 1 1
$x=-1$, $\nexists$, $m=3$ "Cross" 1 2 1
$x=1$, zero, $m=1$ "cross" 1 3 3 1

$\frac{x^3}{x^3} = 1 = y$



Oct 21-8:57 AM