Group Quiz Monday!

- No notes
- No calculator
- No word problems
- Exact values only
- Sketch graph for log and exponential functions

Need extra practice?
Refer to today's assignment plus the 2 other worksheets completed over the past week.

Ch.4 Test Thursday!

- No notes
- Part 1: calculator ok
- Solve 2-3 word problems
- Solve for exact values and approximations
- Part 2: no calculator
- Exact values only
- Sketch graph for log and exponential functions

The following slides are a short summary of chapter 4.

Please see your notes (or links on Mrs. Rosenow's website) for further details.

4.1 notes:

Compounded:
Annually→ n = 1
Semi-annually→ n = 2
Quarterly→ n = 4
Monthly→ n = 12

Compound Interest

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

5% = .05

change to a decimal

A = final amount
P= principal (initial investment)
r = annual (yearly) interest rate
n = # times interest is paid per year (compounded)
t = # of years

4-2 notes:

Continuously Compounded Interest

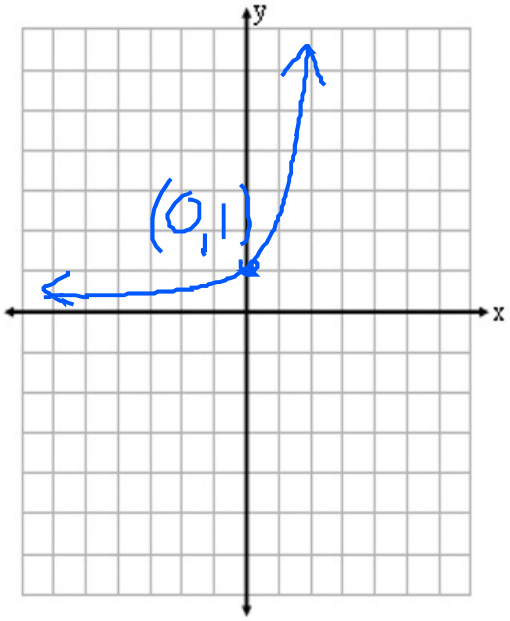
$$A = Pe^{rt}$$

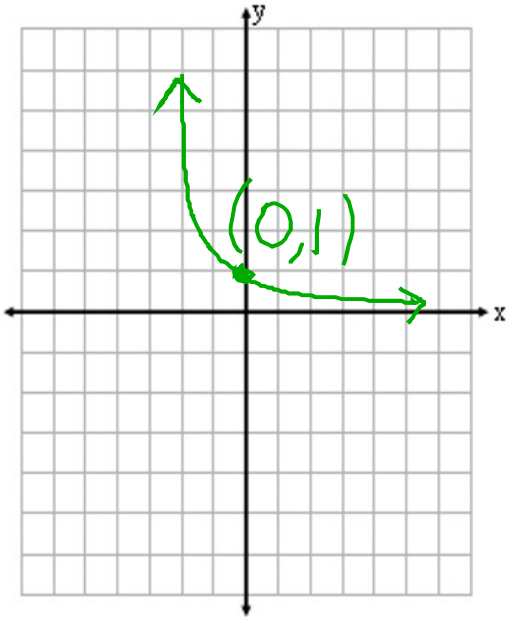
A = final amount
P= principal (initial investment)
r = interest rate
t = # of years

4.2 Notes: The Natural Exponential Function

Sketch a graph of

$y = e^{x}$ and $y = e^{-x}$





NOTES:

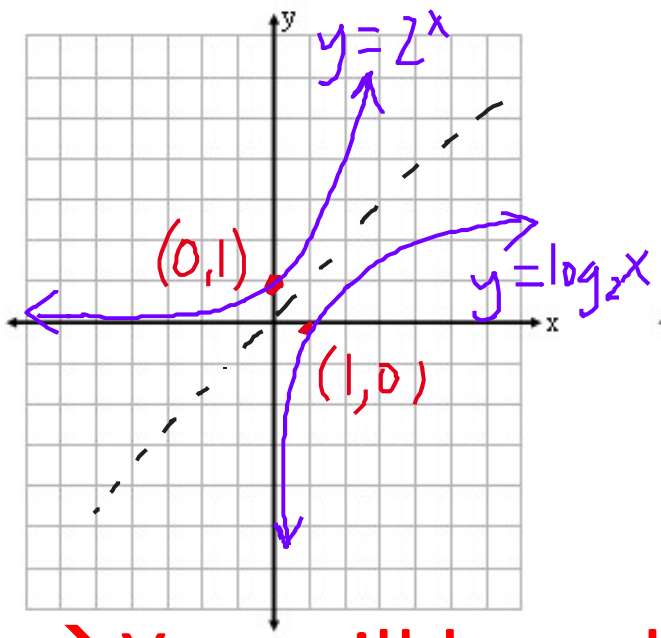
Domain→ $(-\infty, \infty)$

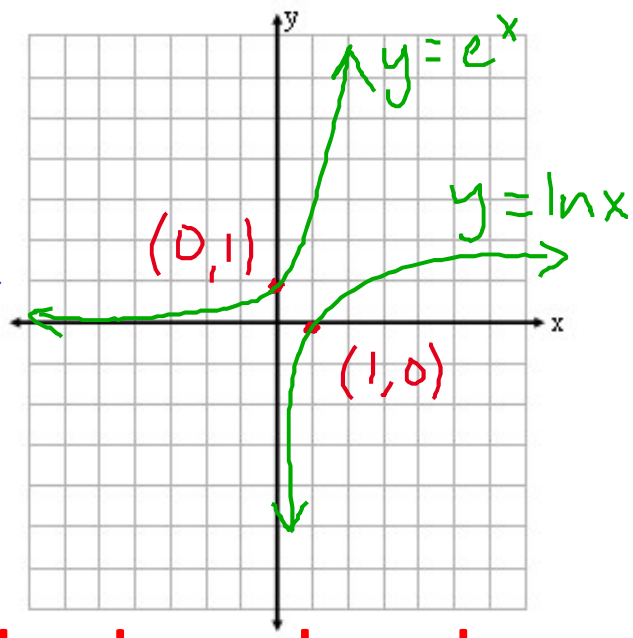
Range→ $(0, \infty)$

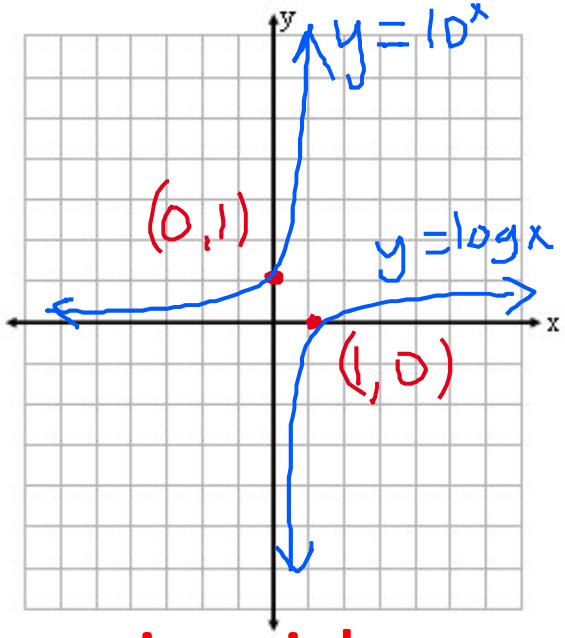
Asymptote at y=0

2^x and $\log_2 x$ | e^x and $\ln x$ | 10^x and $\log x$

General Logarithm | ***Natural Logarithm*** | ***Common Logarithm***







→You will be asked to sketch one pair without a graphing calculator on the quiz and test.

Notes: 4.3 Logarithmic functions

Notes: 4.4 Laws of Logarithms

Product: $\log_b mn = \log_b m + \log_b n$

Quotient: $\log_b \frac{m}{n} = \log_b m - \log_b n$

Power: $\log_b (m)^p = p \log_b m$

one term = one term

Power of Equality: if $\log_b m = \log_b n$,

then m = n

Notes 4.4 Example 2:

Clearly show all steps…apply one property at a time!

$$2\log_6 4 - \frac{1}{4}\log_6 16 = \log_6 x$$

$$\log_6 4^2 - \log_6 16^{\frac{1}{4}} = \log_6 x$$

$$\log_6 \frac{16}{2} = \log_6 x$$

$8 = x$

←Like bases, so inside values are equal to each other by Power of Equality

NOTE: The logs will never drop out on the first step when you have more than two terms!!

Notes: 4.5 Solving Logarithmic Equations

Note:

*If given base **e**, use **ln** to solve.

*If given base **10**, use **log** to solve.

*If given any other base, use ln or log.

Notes: 4.5 (part 2)

Reminder:

log0 = no solution ← or undefined $(\text{because } 10^x = 0)$

log(neg #) = no solution $10^x = neg\,\#$

ln0 = no solution $e^x = 0$

ln(neg #) = no solution $e^x = neg\,\#$

lne = 1

log10 = 1

log1 = 0

4.5 part 1 homework: be able to factor!

Show work! Clearly show all steps.

31. $4^x + 2^{1+2x} = 50$

$2^{2x} + 2^{1+2x} = 50$

$2^{2x}(1 + 2^1) = 50$

$2^{2x}(3) = 50$

$\log 2^{2x} = \log \frac{50}{3}$

$2x \log 2 = \log \frac{50}{3}$

$2x = \frac{\log \frac{50}{3}}{\log 2}$

$x = \frac{\log \frac{50}{3}}{2 \log 2} \approx 2.029447$

- Rewrite using like bases and factor
- Isolate exponential term
- Apply ln or log to both sides of the equation
- "bring down" the exponent
- Solve for x

Notes 4.5 part 2: factoring example

Solve for x: $xe^{2x} + 2xe^{x} = 15x$

- Set equal to 0
- Factor GCF
- Factor using FOIL
- Solve using Zero Product Property
- Check for extraneous answers (no solution)

$$Xe^{2x} + 2xe^{x} - 15x = 0$$

$$x(e^{2x} + 2e^{x} - 15) = 0$$

$$x(e^{x} - 3)(e^{x} + 5) = 0$$

$x = 0$

$e^{x} - 3 = 0$

$e^{x} = 3$

$\ln_e 3 = x$

$x = \ln 3$

$e^{x} + 5 = 0$

$e^{x} = -5$

$\ln_e(-5) = x$

no solution