

Ch. 22 - BOARD PROBLEMS

REWRITE AS AN EXPONENT. REWRITE AS A LOG.

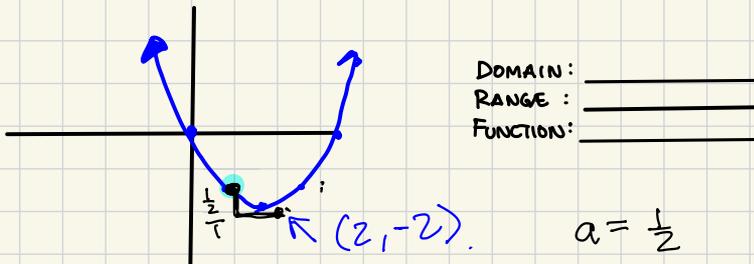
① $\log_{\frac{1}{2}} 2 = -1$

② $9^x = B+2$

SOLVE FOR THE VARIABLE.

③ $\log_{\sqrt{3}} \frac{1}{9} = x$

④ $\log_4 (x+6) + \log_4 x = 2$



⑤ write the equation in VERTEX FORM.

⑥ WRITE ABOVE EQUATION IN STANDARD FORM.

⑦ A BINOMIAL SQUARED ALWAYS BECOMES A:

⑧ $(2x-6)^2 =$ _____

BEFORE WE START

OPPOSITE OF SQUARING (x^2) IS _____

THE INVERSE OF EXPONENTS (2^x) IS _____

Ch. 22 - NATURAL Logarithm (\ln) and e

$$y = e^x$$

$$f(x) = e^x$$

e = EULER'S NUMBER = _____

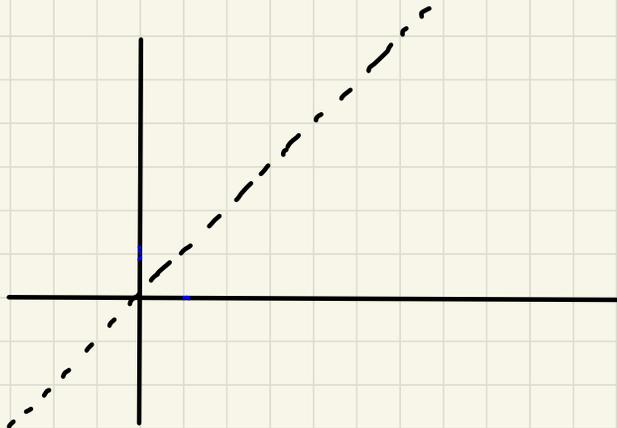
USED FOR EXPONENTIAL GROWTH AND DECAY
AND CONTINUOUSLY COMPOUNDING FUNCTIONS.

Inverse

$$y = \ln x$$

x	e^x
-1	
0	
1	
2	
3	

x	$\ln x$



EX. 1

$$\frac{e^{2x} - e^x}{e^x} =$$

EX. 2

substitute: $y = e^x$

$$\frac{4e^{2x} - 3e^x}{2e^x}$$

$$= \frac{4y - 3}{2} = \boxed{\frac{4e^x - 3}{2}}$$

PRACTICE

FACTOR.

1. $e^{2x} - 1$

2. $e^{2x} - e^x - 6$

3. $e^{2x} - e^x - 2$

4. $2e^{2x} - 5e^x - 3$

THERE WERE INITIALLY 1,000 bacteria present.
FOR THIS CASE Bacteria growth over time
CAN BE MODELED By:

$$N(t) = 1000 e^{.1(t)}$$

general form

1) AT $t=4$ hours, how many bacteria are present?

2) HOW LONG WILL IT TAKE FOR THERE TO BE
10,000 BACTERIA?

RULES FOR ln and e.

$$\textcircled{1} \ln 1 = 0$$

$$\textcircled{2} \ln e = 1$$

$$\textcircled{3} \ln e^x = x$$

$$\textcircled{4} e^{\ln x} = x, \text{ when } x > 0$$

$$\textcircled{5} \ln(x \cdot y) = \ln x + \ln y$$

$$\textcircled{6} \ln \frac{x}{y} = \ln x - \ln y$$

$$\textcircled{7} \ln x^9 = 9 \ln x$$

$$\boxed{\text{EX. 4}} \quad \ln 2e = \ln 2 + \ln e$$

Simplify. (condense first)

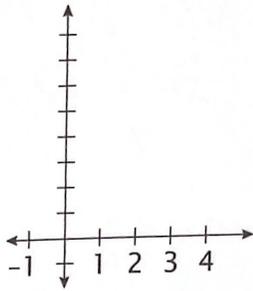
$$\boxed{\text{EX. 5}} \quad 2 \ln 3 - 3 \ln 2$$

$$\boxed{\text{EX. 6}} \quad 4^{x^2} = 9$$

$$\boxed{\text{EX. 7}} \quad 4^{x+2} = 7$$

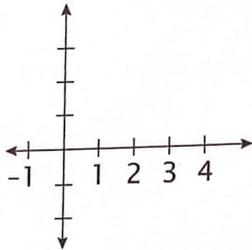
Find the value of y for several values of x and graph each equation.

1. $y = e^{2x}$



x	y
0	1
1	
-1	

2. $y = 2 \ln x$



x	y
1	
2	
3	
.5	

Factor.

3. $\ln^2 x - \ln x - 2$

4. $2 \ln^3 x + 3 \ln^2 x$

5. $3e^{2x} + 5e^x - 2$

6. $\frac{e^{2x} - 1}{e^x - 1}$

LESSON 22A

Solve for x.

7. $2^{5x} = 3^{2x}$

8. $2^x = 4^{x-2}$

9. $e^{2x} = \ln 5$

Read the information given, and answer the questions.

The number of bacteria present in a culture is given by $N(t) = 2000 e^{(.3t)}$.

10. How many bacteria will be in the culture when $t = 2$ hours?

11. How many hours would it take for the bacteria count to reach 100,000?

Logarithmic Equations

Solve each equation. Round your answers to the nearest ten-thousandth.

1) $\log x - \log 2 = \log 17$

2) $\log 8 + \log x = 1$

3) $\log 3 + \log x = 2$

4) $\log x - \log 2 = 1$

Solve each equation.

5) $\log_8 (x^2 - 1) - \log_8 3 = 1$

6) $\log 3x^2 - \log 3 = 2$

7) $\log_8 4x - \log_8 5 = \log_8 39$

8) $\log_7 (x + 4) - \log_7 x = 3$

9) $\ln (5 - 2x) + \ln 9 = 4$

10) $\ln (3x - 1) + \ln 4 = \ln 15$

11) $\ln (10 - 2x^2) - \ln 5 = \ln 2$

12) $\ln 5 - \ln (4 - 4x) = \ln 33$

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