BOARD NOTES

31 OCTOBER 2018

CC ALGEBRA
CHAPTER 4 –
EXPONENTIAL AND LOGARITHMIC FUNCTIONS

- SECTION 4.4 - EXPONENTIAL AND LOGARITHMIC EQUATIONS

Objectives:

- Use like bases to solve exponential equations
- Use logarithms to solve exponential equations
- Use the definition of logarithm to solve logarithmic equations
- Use one-to-one property of logarithms to solve logarithmic equations
- Solve applied problems involving exponential and logarithmic equations

Solving Exponential Equations by Expressing Each Side as a Power of the Same Base

$$\text{If } b^M = b^N, \text{ then } M = N.$$

Express each side as a power of the same base.

Set the exponents equal to each other.

1. Rewrite the equation in the form $b^M = b^N$.
2. Set $M = N$.
3. Solve for the variable.

Using Logarithms to Solve Exponential Equations

1. Isolate the exponential expression.
2. Take the common logarithm on both sides of the equation for base 10. Take the natural logarithm on both sides of the equation for bases other than 10.
3. Simplify using one of the following properties:

$$\ln b^x = x \ln b \quad \text{or} \quad \ln e^x = x \quad \text{or} \quad \log 10^x = x.$$

4. Solve for the variable.

Using the Definition of a Logarithm to Solve Logarithmic Equations

1. Express the equation in the form $\log_b M = c$.
2. Use the definition of a logarithm to rewrite the equation in exponential form:

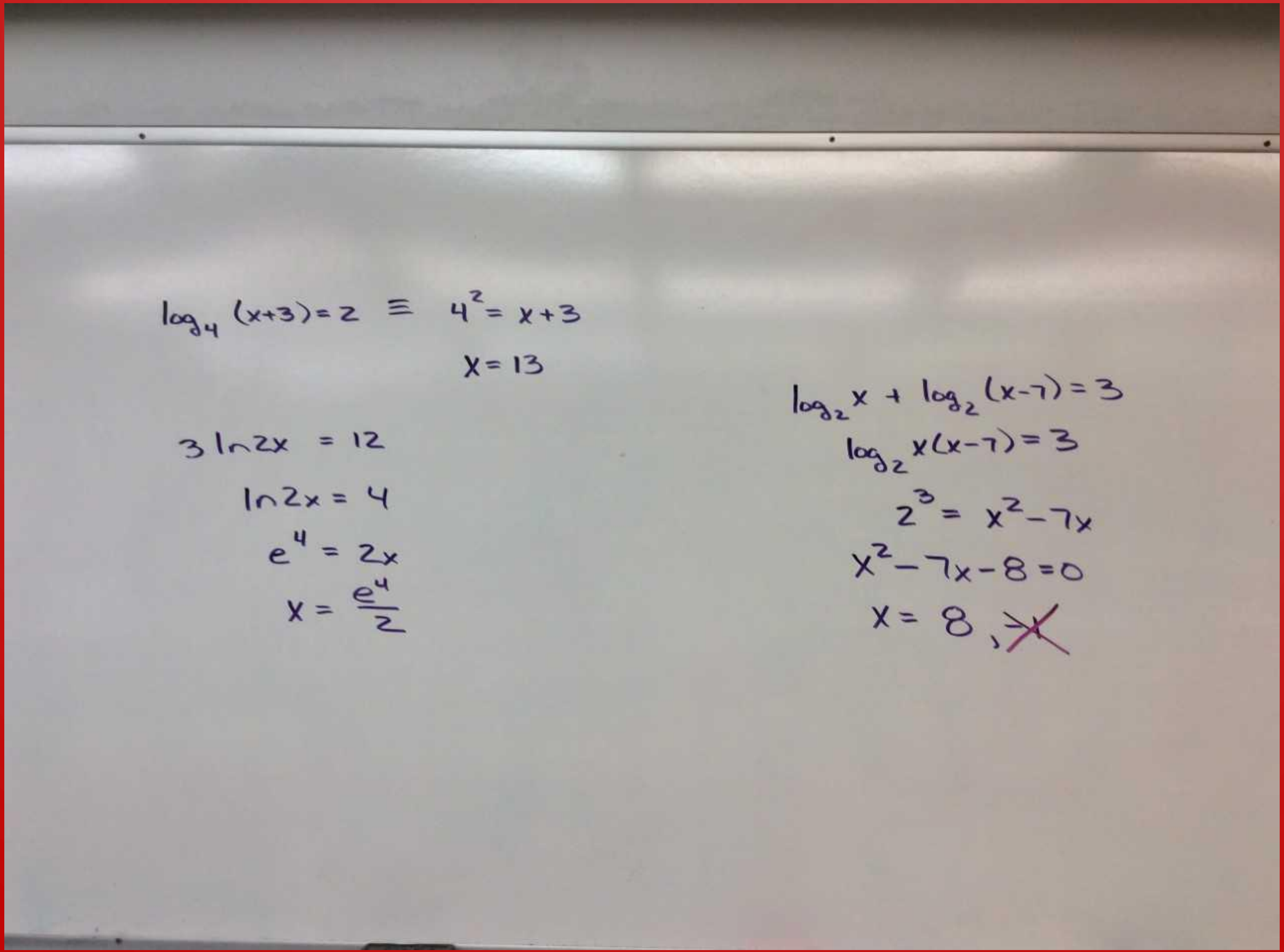
$$\log_b M = c \quad \text{means} \quad b^c = M.$$

Logarithms are exponents.

3. Solve for the variable.
4. Check proposed solutions in the original equation. Include in the solution set only values for which $M > 0$.

Using the One-to-One Property of Logarithms to Solve Logarithmic Equations

1. Express the equation in the form $\log_b M = \log_b N$. This form involves a single logarithm whose coefficient is 1 on each side of the equation.
2. Use the one-to-one property to rewrite the equation without logarithms: If $\log_b M = \log_b N$, then $M = N$.
3. Solve for the variable.
4. Check proposed solutions in the original equation. Include in the solution set only values for which $M > 0$ and $N > 0$.



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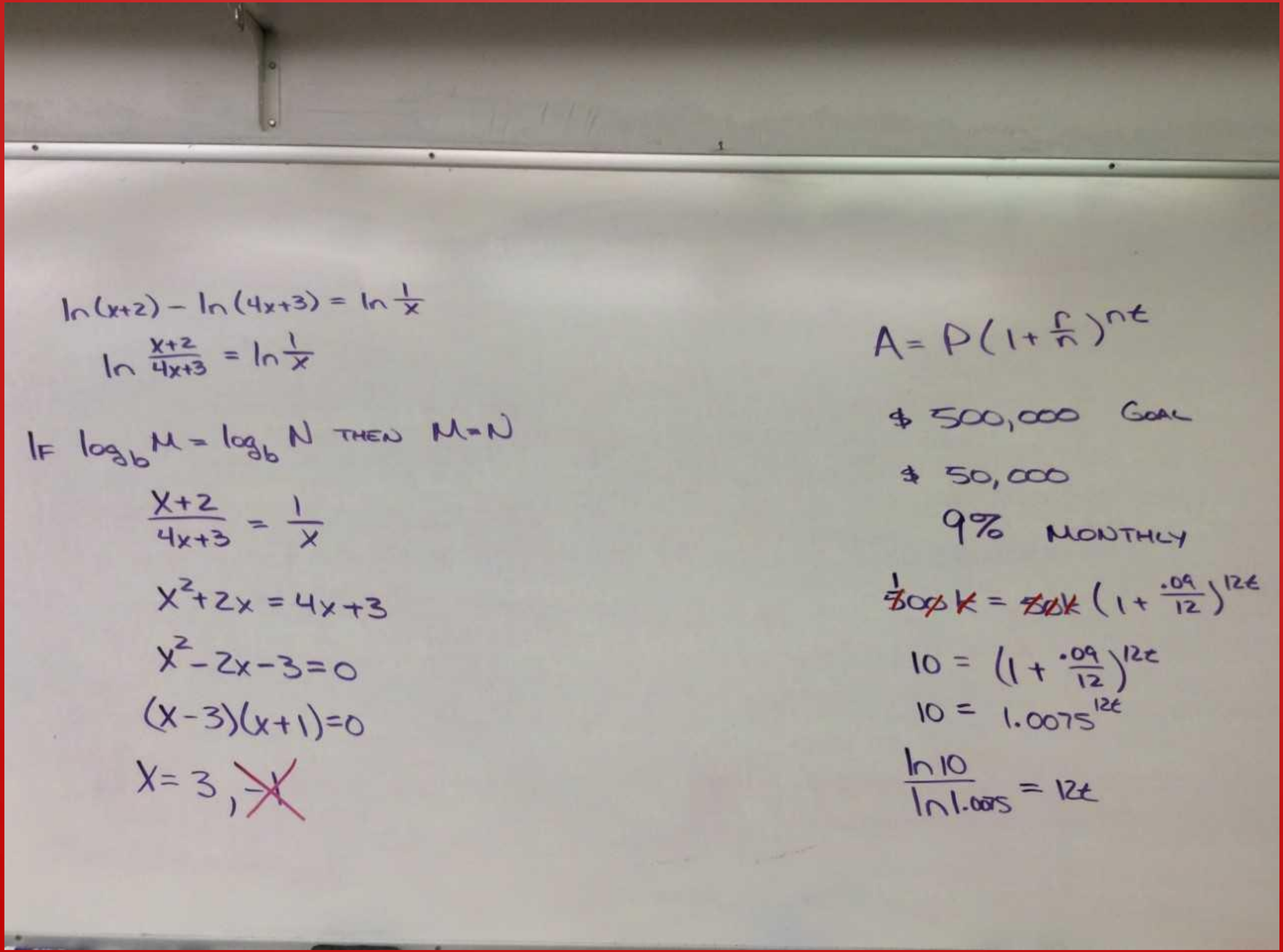
ln(x+2) − ln(4x+3) = ln 1/x
ln (x+2)/(4x+3) = ln 1/x
IF log_b M = log_b N THEN M=N
(x+2)/(4x+3) = 1/x
x^2+2x = 4x+3
x^2−2x−3=0
(x−3)(x+1)=0
X= 3, −1
A= P(1+ r/n)^nt
$ 500,000 GOAL
$ 50,000
9% MONTHLY
500K = 50K (1+ .09/12)^12t
10 = (1+ .09/12)^12t
10 = 1.0075^12t
ln10 / ln1.0075 = 12t