2.13A Exponential and Logarithmic Equations and Inequalities

2.13A Notes

EXAMPLE ONE:

$$\log_3 x + \log_3(x + 7) = \log_3 60$$

IF
$$log_a B = log_a C$$

THEN
$$B = C$$

EXAMPLE TWO:

$$3 - \log_2(x + 7) = \log_2 5$$

Solve an equation with logs and constants.

EXAMPLE THREE:

$$3(2)^{x+2} = 12$$

Use logs to solve exponentials!

EXAMPLE FOUR:

$$\log(x + 6) + 3 = 2$$

Use technology!!!

Up for the challenge? Try these!

Ex 5: $\ln \sqrt{x - 12} = 4$

Ex 6: $9\left(\frac{1}{27}\right)^{\frac{x}{3}} = 81$

Ex 7: $\log(2x + 7) + \log 3 = \log (x + 6)$

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AP Precalculus

2.13A Practice

CALCULATOR ACTIVE. Solve each equation. Have both the exact answer and the answer rounded to three decimal places.

1. $\log_5 x = 2$	2. $e^{-x} = 3.65$
3. $\log x + \log(x - 3) = 1$	4. $80e^{0.045x} = 240$

5. $\log_3(5 - 2x) = \log_3(3x + 1)$

6. $3 - \log_4(x + 3) = 5$

7. $\ln 12 = \ln(2x + 3) - \ln(x - 4)$

8. $e^{2x-1} + 68 = 207$

9. $\log_2(3x - 52) - 4 = \log_2 x$

10. $\log_3 \sqrt{2x + 3} = 1$

11. $\ln x + \ln(x - 10) = \ln 24$

12. $3(2^{x+4}) - 12 = -10$

13. $0.5e^{\frac{x}{4}} = 12$

14. $\frac{3}{4}\ln\left(\frac{4}{5}x\right) + 10 = 12$

15. Use the formula for continuously compounded to solve. $A = Pe^{rt}$, where A is how much money we currently have, P is the principal (how much we started with), r is the interest rate and t, is the amount of time in years.

   Mr. Kelly currently has \$450,000 in an investment account. He originally put in \$200,000 into the account which earns 4.5% interest. How many years has he been investing in this account?

16. Consider the functions f and g given by $f(x) = \ln(-x + 8)$ and $g(x) = \ln(x + 2) + \ln(x - 8)$. In the xy-plane, what are all the x-coordinates of the points of intersection of the graphs of f and g?

(A) $x = 8$

(B) $x = -3$

(C) $x = 8$ and $x = -3$

(D)   No Solution

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17. Solve the equation $\log_b a + \log_b 5 = c$ for a.

(A) $\dfrac{5}{b^c}$

(B) $5b^c$

(C) $b^c - 5$

(D) $\dfrac{b^c}{5}$

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18. What are all values of x for which $\ln(x^5) = \ln(x^3) + 16$?

(A) $x = e^8$ and $x = -e^8$

(B) $x = -e^8$

(C) $x = e^8$

(D) $x = 8$ and $x = -8$