

1. Let $f(t) = 5t - 1$. Solve each of the following equations exactly for t .

(a) $f(t) = 3$

(c) $(f(t))^{-1} = 3$

(b) $f^{-1}(t) = 3$

(d) $f(t^{-1}) = 3$

2. Show that $f(x) = \frac{x + 1}{x - 1}$ is its own inverse by computing $f(f(x))$.

3. Laws of Exponents and Corresponding Law of Logarithms

Rule	Exp Rule	Result	Law Rule	Result
Add/Product	$b^x b^y =$		$\log_b(xy) =$	
Subt/Divide	$\frac{b^x}{b^y} =$		$\log_b(x/y) =$	
Powers	$(b^x)^y =$		$\log_b(x^y) =$	
Common Value	$b^0 =$		$\log_b(1) =$	

4. Quick Logarithm Calculations [No calculators.]

Example: $\log_2 32 = \underline{\hspace{2cm}}$ Thought: Since logs are just powers, we can think about the alternative question: $2^? = 32$ Two raised to what power is 32 gives us the answer of 5.

(a) $\log_5 25 = \underline{\hspace{2cm}}$ [$5^? = 25$]

(d) $\ln e^{\sqrt{5}} = \underline{\hspace{2cm}}$

(b) $\log_4 \frac{1}{64} = \underline{\hspace{2cm}}$

(e) $\log 100 = \underline{\hspace{2cm}}$

(c) $\log_9 3 = \underline{\hspace{2cm}}$

(f) $\log_{11} 1 = \underline{\hspace{2cm}}$

5. Calculate $\ln[e\sqrt{e^3}]$

6. Write as the natural log of a single expression.

$$3 \ln(2) + \ln(6)$$

$$3 \ln(x^{1/2}) - \ln(5x)$$

7. Solve for the unknown variable. [Note: Do these without logs.]

$$125^x = \frac{1}{25}$$

$$(\sqrt{32})^x = 16$$

$$t^{3/2} = 27$$

8. When a cherry plant is growing, it follows a logarithmic growth curve. The height of the plant h in cm after t days of being planted is modeled by

$$h(t) = 5 \ln(t - 21) + 3, \quad 22 \leq t \leq 48$$

When will the plant be 10 cm tall? Be sure to include units.

9. A 50 gallon barrel is filled completely with pure water. Salt water with a concentration of 0.3 lb/gal is then pumped into the barrel, and the resulting mixture overflows at the same rate. The amount of salt in the barrel at time t is given by

$$Q(t) = 15(1 - e^{-0.04t})$$

where t is measured in minutes and $Q(t)$ is measured in pounds.

(a) How much salt is in the barrel at 0 minutes?

(b) How much salt is in the barrel after 5 minutes?

(c) How much salt is in the barrel after 10 minutes?

(d) Determine the value that the amount of salt in the barrel approaches as t becomes larger and larger.