

Homework #4 Part C

Please note that this is not to be turned in.

1. Write each of the following in terms of logarithms of a single base b , which is given. Give the answer in the form specified.

(a): $\log_2 6$, write as a single logarithm with base $b = 4$.

(b): $\log_3 7 - 2\log_3 2$, write as a quotient of two natural logarithms, so $b = e$ (as $\frac{\ln x}{\ln y}$ for some x and y).

2. Evaluate each of the following expressions:

(a): $(\ln 5)(\log_5 e)$ (b): $\frac{\ln 3 + \ln 12}{\ln 12 - \ln 2}$ (c): $\frac{\log_5(\sqrt[6]{27})}{\log_5 3}$ (d): $5^{a/b}$ if $a = \ln 4$ and $b = \ln 5$

3. Explain why $\log_2 3 - \log_4 5 = \log_4 \left(\frac{9}{5}\right)$ by using properties of changing logarithm base.

4. Solve for x in the equation $\ln 2 + 2\frac{\log_2 x}{\log_2 e} = \ln(2 - 3x)$.

5. If $A = P\left(1 + \frac{r}{n}\right)^{nt}$, then solve for t using natural logarithms. Start by taking the natural logarithm of both sides.

6. Find all values of x for which the expression $\log_3(4x - 7)$ is defined.

7. Find all values of x for which the expression $\ln(x^2 - 4x - 5)$ is defined.

8. Explain why the expression $\ln(x^2 + 1)$ is defined for all values of x . What is the set of outputs of the expression, if x can be any real number?

9. Find all values of x for which the expression $\sqrt{\log_2(x^2 - 3x - 9)}$ is defined (as a real number).

Hint: For the expression to be defined, we need $\log_2(x^2 - 3x - 9) \geq 0$. Since $\log_2 1 = 0$, for what numbers M is $\log_2 M \geq 0$?