ACMAT118 Spring 2024
Professor Manguba-Glover
Section 5.5 Classwork (CW 3) Name: _____

Complete as many of the following problems as you can with your table. You do not have to go in order. If **your entire table** finishes early, and your answers have been checked, you may leave early.

1. Combine into a single logarithm

   (a) $\ln(xy) - x\ln(2) - \frac{1}{2}\ln(x-y)$

   (b) $\log_{10}(30) + \log_{10}(2)$

   (c) $\log_5(6) + \log_5\left(\frac{1}{3}\right) + \log_5(10)$

   (d) $\log_b(4) + 3\log_b(1+x) - \frac{3}{2}\log_b(1-x)$

2. Write as a sum and/or difference of multiples of logarithms:

   (a) $\log_5\left(\frac{(y-1)^3}{\sqrt{x}(x+1)^4}\right)$

   (b) $\log_{10}\left(\frac{x^2}{1+x^2}\right)$

   (c) $\ln\left(\frac{x^2}{\sqrt{1+x^2}}\right)$

   (d) $\ln\left(\frac{\sqrt{4-x^2}}{(x-1)(x+1)^{3/2}}\right)$

3. Express the following in terms of natural logarithms (ln) and common logarithms (log):

   (a) $\log_2(6)$

   (b) $\log_4(e)$

Key:

1. (a) $\ln\left(\frac{xy}{(2^x)\sqrt{x-y}}\right)$
   (b) $\log_{10}(60)$
   (c) $\log_5(20)$
   (d) $\log_b\left(\frac{4(1+x)^3}{(1-x)^{3/2}}\right)$
2. (a) $3\log_5(y-1) - \frac{1}{2}\log_5(x) - 4\log_5(x+1)$
   (b) $2\log_{10}(x) - \log_{10}(1+x^2)$
   (c) $2\ln(x) - \frac{1}{2}\ln(1+x^2)$
   (d) $\frac{1}{2}\ln(2+x) + \frac{1}{2}\ln(2-x) - \ln(x-1) - \frac{3}{2}\ln(x+1)$
3. (a) $\frac{\ln(6)}{\ln(10)}$ and $\frac{\log 6}{\log 2}$
   (b) $\frac{1}{\ln(4)}$ and $\frac{\log e}{\log 4}$