

**Math 173 – Section 5.4: Properties of Logs**  
(things you might want to memorize)

**Properties of logs:**

Product Rule:

$$\log_a(MN) = \log_a M + \log_a N$$

Quotient Rule:

$$\log_a\left(\frac{M}{N}\right) = \log_a M - \log_a N$$

Power Rule:

$$\log_a M^N = N \log_a M$$

Base-change Formula:

$$\log_a M = \frac{\log_b M}{\log_b a} \quad \left( = \frac{\log M}{\log a} = \frac{\ln M}{\ln a} \right)$$

Two other useful properties:

$$\log_a a^x = x \quad \text{and} \quad a^{\log_a x} = x$$

Useful formulae for word problems:

$$A = P\left(1 + \frac{r}{n}\right)^{nt} \quad \text{and} \quad A = A_0 e^{rt}$$