

UNIT 3

Properties of Logarithms

- ① $\log_a(uv) = \log_a u + \log_a v$ "mult becomes add"
- ② $\log_a\left(\frac{u}{v}\right) = \log_a u - \log_a v$ "div becomes sub"
- ③ $\log_a u^n = n \log_a u$ "exponent becomes coefficient"

Examples "Expand"

$$\text{Ex 1) } \log_3(xy)^2 = 2[\log_3 x + \log_3 y]$$

$$\text{Ex 2) } \ln \sqrt{\frac{xy}{b}} \quad \text{rewrite } \ln \left(\frac{xy}{b}\right)^{\frac{1}{2}}$$

$$\text{so } \frac{1}{2} \ln \left(\frac{xy}{b}\right) = \frac{1}{2} [(\ln x + \ln y) - \ln b]$$

$$\text{or } \frac{1}{2} \ln x + \frac{1}{2} \ln y - \frac{1}{2} \ln b$$

$$\text{Ex 3) } \ln \frac{\sqrt{3x-5}}{7} = \frac{1}{2} \ln(3x-5) - \ln 7$$

* Note - Logs are helpful in solving equations that involve large or small quantities. Compound Interest *