Name: ____ Date: ____________ IB Math A&A SL

Lesson 3.6 - Properties of Logarithms

I. Properties of Logs

Let a be a positive number such that $a \neq 1$, and let *n* be a real number. If *u* and *v* are positive real numbers, the following properties are true:

i. $\log_a(uv) = \log_a(u) + \log_a(v)$

ii. $\log_a\left(\frac{u}{v}\right) = \log_a(u) - \log_a(v)$

iii. $\log_a(u^n) = n \cdot \log_a(u)$

iv. $\log_a(x) = \frac{\log_b(x)}{\log_b(a)}$

Use the properties of logs to expand the following:

1. $\log(3x^4y^2)$

2. $\log\left(\frac{\sqrt{3x-5}}{7x^3}\right)$

3. $\log\left[\left(\frac{4x^3}{y}\right)^2\right]$

Use the properties of logs to condense the following:

4. $2\log(x+2) - \frac{1}{3}[\log(x) + \log(y)]$

5. $\log(x) - 3\log(x+1)$

6. $\log_5(75) - \log_5(3)$

If $\log(2) \approx 0.301$ and $\log(7) \approx 0.845$ find the following <u>without</u> a calculator (show work).

7. $\log(2^3)$

8. $\log(14)$

9. $\log(20)$

10. $\log(7000)$

11. $\log\left(\frac{1}{7}\right)$

12. $\log(5)$

13. Evaluate without a calculator: $\frac{\log_3(2)}{\log_3(8)}$

14. Show that $\log(3) \cdot \ln(10) \ = \ln(3)$

15. Show that $\log_{\frac{1}{4}}(x) = -\log_4(x)$