

## CMSC 341 Spring 2013 Math Review

Exponents:

$$(X^A)^B = X^{AB}$$

$$X^A * X^B = X^{A+B}$$

$$X^A / X^B = X^{A-B}$$

Logarithms:

$$\log A^k = k \log A$$

$$\log AB = \log A + \log B; \log(A/B) = \log A - \log B$$

$$\log_a n = \log_b n / \log_b a$$

$$\log X < X \text{ for all } X > 0$$

Series and Sums:

$$2^0 + 2^1 \dots + 2^N = \sum_{i=0}^N 2^i = 2^{N+1} - 1$$

$$\sum_{i=M}^N A^i = \begin{cases} \frac{A^{N+1} - A^M}{A - 1} & \text{if } A > 1; \\ \frac{A^M - A^{N+1}}{1 - A} & \text{if } A < 1; \end{cases}$$

$$\sum_{i=0}^{\infty} A^i = \lim_{i \rightarrow \infty} \frac{1 - A^{i+1}}{1 - A} = \frac{1}{1 - A} \quad (A < 1)$$

$$\sum_{i=1}^N i = \frac{N(N+1)}{2} \approx \frac{N^2}{2}; \quad \sum_{i=1}^N i^2 = \frac{N(N+1)(2N+1)}{6} \approx \frac{N^3}{3}$$

$$1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \dots = \sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{n} = \ln(2).$$