

Useful Formulas:

Summations:

- Constant series: $\sum_{i=j}^k a = a(k - j + 1)$
- Arithmetic series: $\sum_{i=1}^n i = \frac{n(n+1)}{2}$
- Finite Geometric series: $\sum_{i=0}^n r^i = \frac{1-r^{n+1}}{1-r}$

Logarithms:

- $\ln(n) = \log_e(n)$
- $\log^k(n) = (\log(n))^k$
- $\log_c(ab) = \log_c(a) + \log_c(b)$
- $\log_c(\frac{a}{b}) = \log_c(a) - \log_c(b)$
- $\log_b(a^n) = n\log_b(a)$
- $a^{\log_b(c)} = c^{\log_b(a)}$
- Logarithmic change of base: $\log_b(a) = \frac{\log_c(a)}{\log_c(b)}$
- $\frac{d}{dn} \ln(n) = \frac{1}{n}$.
- $\frac{d}{dn} \log_b(n) = \frac{1}{n \ln(b)}$.