

Math 17B

Vogler

Summation Rules

$$1) \sum_{i=1}^n c = \underbrace{c + c + \dots + c}_{n \text{ times}} = nc$$

$$2) \sum_{i=1}^n c \cdot f(i) = c \sum_{i=1}^n f(i)$$

$$3) \sum_{i=1}^n [f(i) \pm g(i)] = \sum_{i=1}^n f(i) \pm \sum_{i=1}^n g(i)$$

$$4) \sum_{i=1}^n i = 1 + 2 + 3 + \dots + n = \frac{1}{2} n(n+1)$$

$$5) \sum_{i=1}^n i^2 = 1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{1}{6} n(n+1)(2n+1)$$

$$6) \sum_{i=1}^n i^3 = 1^3 + 2^3 + 3^3 + \dots + n^3 = \left[\frac{1}{2} n(n+1) \right]^2$$

$$7) \sum_{i=0}^n r^i = 1 + r + r^2 + \dots + r^n = \frac{1 - r^{n+1}}{1 - r}$$

Notes: a) Rules 1) and 4-6) must start at $i=1$, and Rule 7 must start at $i=0$.

b) These rules are essential in evaluating Riemann sums, which we will discuss next lecture.