Workshop 1

1. Consider the following sum
\[ \sum_{i=4}^{12} (i + 2)^3. \]

a. Shift the series to a sum for \( j = i + 2 \).

b. Use the formula
\[ \sum_{i=1}^{N} i^3 = \left( \frac{N(N+1)}{2} \right)^2 \]

to calculate the sum (no need to simplify the result).

2. Geometric sums. For the following \( r \neq 1 \). Recall that \( r^0 = 1 \).

Let \( S_N = \sum_{i=0}^{N} r^i \).

a. Express \( \sum_{i=1}^{N+1} r^i \) in terms of \( S_N \) by multiplying by a constant.

b. Express \( \sum_{i=1}^{N+1} r^i \) in terms of \( S_N \) by adding the new end point and subtracting the missing initial point.

c. Equate the two expressions and solve for \( S_N \).