Math 306 (Barsamian) Class Drill 4.1.1: Sequences

[1] (a) Let \( a_k = \frac{7-k}{7+k} \) for \( k \geq 1 \). Write the first five terms of the sequence.

(b) Let \( c_k = 2k^3 \) for \( k \geq 1 \). Write the first five terms of the sequence.

(c) Let \( c_k = (-1)^k \) for \( k \geq 0 \). Write the first five terms of the sequence.

(d) Let \( d_k = \frac{(-1)^k}{3^k} \) for \( k \geq 0 \). Write the first five terms of the sequence.

[2] (a) Find an explicit formula for the sequence that begins \(-1, 1, -1, 1, \ldots\).

(b) Find an explicit formula for the sequence that begins \( 1, \frac{-1}{2}, \frac{1}{4}, \frac{-1}{8}, \ldots \).

(c) Find an explicit formula for the sequence that begins \( \frac{1}{4}, \frac{2}{9}, \frac{3}{16}, \frac{4}{25}, \frac{5}{36}, \ldots \).

(d) Find an explicit formula for the sequence that begins \(-1, 3, -9, 27, -81, \ldots\).
Math 306 (Barsamian) Class Drill 4.1.2: Summation and Product Notation

[1] Compute the following sums and products.

(a) \[ \sum_{k=0}^{4} k^3 \]

(b) \[ \sum_{k=0}^{4} 3^k \]

(c) \[ \prod_{k=0}^{100} (-1)^{k+1} \]

(d) \[ \sum_{k=2}^{100} \left( \frac{1}{n} - \frac{1}{n-1} \right) \] (hint: telescoping sum)

[2] Rewrite the following using summation notation. (Do not compute the numbers!!)

(a) \[ 3 + 6 + 9 + \ldots + 150 \]

(b) \[ 3 + 6 + 9 + \ldots + 3n \]

(c) \[ 1^4 + 2^4 + 3^4 + \ldots + 972^4 \]

(d) \[ 1^4 + 2^4 + 3^4 + \ldots + n^4 \]

(e) \[ 5 + 15 + 45 + 135 + \ldots + 5 \cdot 3^{17} \]

(f) \[ 5 + 15 + 45 + 135 + \ldots + 5 \cdot 3^n \]