

Math 102 — Sequences

Problem 1. Write out the first 5 terms of each of the following sequences, given the formula s_n where $n \geq 1$.

a. $s_n = 2^n + 1$

b. $s_n = \frac{2n}{2n+1}$

c. $s_n = (-1)^{n+1} \left(\frac{1}{2}\right)^{n-1}$

Problem 2. Given the first few terms of the sequence, find a general formula for s_n where $n \geq 1$.

a. 4, 8, 16, 32, 64, ...

b. $1/3, 2/5, 3/7, 4/9, 5/11, \dots$

c. $1/2, -1/4, 1/6, -1/8, 1/10, \dots$

Problem 3. For each of the following sequences, find its limit or state that the sequence diverges. You might find it helpful to list out the first few terms of the sequence to get a sense of its behavior as n gets larger.

a. $s_n = (-0.9)^n$

b. $s_n = 2^n$

c. $s_n = 3^{-n}$

d. $s_n = 5 + e^{-3n}$

e. $s_n = \frac{1}{n} + n^2$

Problem 4. For each of the following sequences, find its limit or state that the sequence diverges.

a. $s_n = \frac{n+3}{2n^2+1}$

b. $s_n = \frac{2n^2+1}{7n+3}$

c. $s_n = \frac{11n^3+3n^2}{5n^3+7n+1}$

d. $s_n = \frac{\cos(\pi n)}{n^2}$

e. $s_n = \frac{4n+(-1)^n 7}{8n+(-1)^n 9}$