W07 Regular

Due date: Sunday 3/8, 11:59pm

01

Computing the terms of a sequence

Calculate the first four terms of each sequence from the given general term, starting at $n = 1$:

(a) $\cos \pi n$ (b) $\frac{n!}{2^n}$ (c) $(-1)^{n+1}$ (d) $\frac{n}{n+1}$ (e) $\frac{3^n}{n!}$ (f) $\frac{(2n-1)!}{n!}$

02 ★

Squeeze theorem

Determine whether the sequence converges, and if it does, find its limit:

(a) $a_n = \dfrac{\cos^2 n}{2^n}$ (b) $b_n = (2^n + 3^n)^{1/n}$

(Hint for (b): Verify that $3 \leq b_n \leq (2 \cdot 3^n)^{1/n}$.)

03 ★

Series from its partial sums

Suppose we know that the *partial sums* S_N of a series $S = \sum_{n=1}^{\infty} a_n$ are given by the formula $S_N = 5 - \frac{2}{N^2}$.

(a) Compute a_3.

(b) Find a formula for the general term a_n.

(c) Find the sum S.

04 ★

Partial sums and total sum

Consider the series:

$$\sum_{n=1}^{\infty} \frac{(-8)^{n-1}}{9^n}$$

(a) Compute a formula for the N^{th} partial sum S_N by applying the "shift method" steps using the values in this series.

(b) By taking the limit of this formula as $N \to \infty$, find the value of the series.

(c) Find the same value of the series by computing a_0 and r and plugging into $S = \frac{a_0}{1-r}$.