

Calculus II – Show Your Work Problems

Module 5:

1. Find a formula for the n th term of each of the following sequences. Indicate whether you are starting with $n = 0$ or $n = 1$ in your formula.

a. $\{1, -3, 5, -7, 9, -11, \dots\}$

b. $\left\{\frac{1}{1}, \frac{2}{10}, \frac{3}{100}, \frac{4}{1000}, \dots\right\}$

2. Establish the convergence or divergence of each sequence. Find the limit if a sequence converges. Assume that the starting point is $k = 1$ in each case.

a. $a_k = \left(\frac{k-2}{k}\right)^{2k}$

b. $b_k = (-1)^k \sin(k\pi)$

c. $c_k = \frac{\sin 2k}{k^2}$

d. $d_k = (-1)^{k+1} \frac{k+1}{2k}$

3. Establish the convergence or divergence of each series. Find the sum if the series converges.

a. $\sum_{k=0}^{\infty} \frac{2^{k-1}}{3^{k+1}}$

b. $\sum_{k=1}^{\infty} \frac{\pi^{2k-2}}{(2^k)(3^{k+1})}$

c. $\sum_{k=1}^{\infty} \frac{1}{(k+4)(k+5)}$