

## Problem Set #5

Due Thursday, March 19, 2026 @ 11:59 pm  
Submit as a single pdf file to Canvas

Remember to review the Guidelines for Problem Sets in the Course Policies on the course webpage when writing up your solutions. A list of computations with no explanation is not acceptable for the Problem Sets. The general rule of thumb is that you should give enough explanation so that you could hand your assignment to a student who took Calc II last semester and they could follow your thought process.

1. Do the following series converge or diverge?

*Remember that you need to explain your answers and reference any tests used!*

$$(a) \sum_{k=2}^{\infty} \frac{2k}{k^3 + k + 3} \qquad (b) \sum_{k=1}^{\infty} k e^{-k}$$

2. Consider the series  $\sum_{k=0}^{\infty} \frac{(-1)^k}{2k+1}$

- (a) Show that the series converges.  
(b) Use WolframAlpha or Desmos to compute  $S_{50}$ .  
How close is your partial sum to the exact value of the series? Why?

3. Consider the power series  $P(x) = \sum_{k=0}^{\infty} (4x)^k$

What is the domain of  $P(x)$ ? That is, for which values of  $x$  does  $P(x)$  converge?

4. Use the Maclaurin series for  $\sin(x)$  and a four-function calculator ( $+$ ,  $-$ ,  $\times$ ,  $\div$ ) to approximate  $\sin(1)$  accurate with 0.001 of its exact value.

Explain how you know your answer is within this level of accuracy.