

*Due Wednesday of Week 4 at the start of class*

Complete the following problems and submit them as a pdf to Canvas. 8 points are awarded for thoroughly attempting every problem, and I'll select three problems to grade on correctness for 4 points each. Enough work should be shown that there is no question about the mathematical process used to obtain your answers.

In problems 1–6, determine if the series converges.

1.  $\sum_{n=1}^{\infty} \frac{n}{n^2 + 1}.$

2.  $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}.$

3.  $\sum_{k=1}^{\infty} \sin(k).$

4.  $\sum_{n=2}^{\infty} \frac{1}{n\sqrt{n^2 - 1}}.$

5.  $\sum_{n=2}^{\infty} \frac{1}{n \ln n}.$

6.  $\sum_{m=1}^{\infty} \frac{\ln(m)}{m^2}.$

7. For each of the series in problems 1–6 that converges, find a value of  $N$  so that the  $N$ th remainder  $R_N$  is below 0.01. Then compute the  $N$ th partial sum of the series with a tool like WolframAlpha.

8. You want to play a game with a fair 4-sided die (one with labels 1–4, each with an equal chance of being rolled). However, you only have a 6-sided die. If you roll the 6-sided die and reroll it whenever you get a 5 or 6 until you get a number between 1 and 4, is this equivalent to a 4-sided die?

9. Is there a way to use only a 6-sided die to emulate a 12-sided one? What about an 8-sided one? A 7-sided

one?