1. [15 points] Evaluate each series or show it diverges.

   (a) [5 points] \( \sum_{n=1}^{\infty} \frac{7}{2^n+1} \)

   (b) [5 points] \( \sum_{n=1}^{\infty} \frac{2}{n^2 + 5n + 6} \)

   (c) [5 points] \( \sum_{n=1}^{\infty} \frac{(-3)^n}{2^{n+1}} \)
2. [15 points] Determine whether the series below converge or diverge.

(a) [5 points] \[ \sum_{n=1}^{\infty} \frac{2^n}{n^2 + 3^n} \]

(b) [5 points] \[ \sum_{n=2}^{\infty} \frac{1}{n(\ln n)^3} \]

(c) [5 points] \[ \sum_{n=1}^{\infty} \frac{2n + 3}{n^3 + 5} \]
3. [20 points] Find the interval of convergence. Be sure to check the end points.

(a) [10 points] \[ \sum_{n=0}^{\infty} \frac{5^n x^n}{n + 1} \]

(b) [10 points] \[ \sum_{n=0}^{\infty} \frac{(-2)^n (3 - x)^n}{(n + 3)^2} \]
4. [30 points] Determine whether each series is absolutely convergent, conditionally convergent, or divergent.

(a) [10 points] \( \sum_{n=1}^{\infty} \frac{(-3)^n}{n^3} \)

(b) [10 points] \( \sum_{n=1}^{\infty} \left( \frac{n^2 + 1}{2n^2 + 1} \right)^n \)

(c) [10 points] \( \sum_{n=0}^{\infty} (-1)^n \frac{n + 2}{n^2 + 1} \)
5. [10 points] Find the Taylor series of \( \frac{\sin(x^2)}{x} \), centered at zero. Write out the first four nonzero terms, and express in \( \sum \)-notation.

6. [10 points] Find the first three terms of the Taylor series of \( \sec x \), centered at \( \pi/3 \). (Work out the exact values of the terms for full credit.)