1. Let $f(x) = \dfrac{4}{4+x^2}$.

   (a) Find a power series representation of $f(x)$. What is its radius of convergence?

   (b) Find a power series representation of $f'(x)$. What is its *interval* of convergence?

2. If $\sum c_n(x-1)^n$ converges at $x=-1$ and diverges at $x=5$, what can you say about the convergence of the power series when:

   (a) $x=6$? (b) $x=2$? (c) $x=4$?

3. Find the 3rd-degree Taylor polynomial centered at $x=2$ for the function $g(x) = \sin(x-2) + \ln x$.

4. Determine whether the following series converge conditionally, converge absolutely, or diverge. Explain.

(a) $\displaystyle\sum_{k=1}^{\infty} \frac{\sin(k)+2}{k^3}$

(b) $\displaystyle\sum_{n=1}^{\infty} ne^{-n^2}$

(c) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n \cdot 7^{n+1}}{(n+3)!}$

5. True or false?

(a) If $\displaystyle\sum_{n=0}^{\infty} a_n x^n$ converges for $x = 2$, then it also converges for $x = -1$.

(b) If $\displaystyle\sum_{n=1}^{\infty} \left(a_n + \frac{1}{n^2}\right)$ diverges, then $\displaystyle\sum_{n=1}^{\infty} a_n$ diverges.

(c) If $\sum(a_n - b_n)$ is convergent, then $\sum a_n$ and $\sum b_n$ both converge.