1. Determine the interval of convergence and radius of convergence of the power series, making sure to test endpoints.

   (a) \[ \sum_{k=0}^{\infty} \left( \frac{x + 1}{8} \right)^k \]
   (b) \[ \sum_{k=1}^{\infty} \frac{(2x + 3)^k}{6k} \]
   (c) \[ \sum_{k=1}^{\infty} \frac{(-1)^k (x + 2)^k}{k \cdot 2^k} \]

2. Use the geometric series to find the power series representation (centered at 0) of

   \[ h(x) = \frac{2}{3x + 1}. \]

   Give the interval of convergence of the new series.

3. Find the function represented by the series

   \[ \sum_{k=0}^{\infty} (\sqrt{x} + 4)^k, \]

   and give the interval of convergence.

4. Let \( f(x) = \sin(3x) \).

   (a) Find the first four nonzero terms of the Maclaurin series for \( f \).
   (b) Write the power series using summation notation.
   (c) Determine the interval of convergence for the series.

5. Use a Taylor series to approximate the value of the definite integral

   \[ \int_0^{0.2} \sin(x^2) \, dx \]

   with an absolute error less than \( 10^{-10} \).

6. Consider the parametric equations

   \[ x = \sqrt{t} + 4, \quad y = 3\sqrt{t}; \quad 0 \leq t \leq 16. \]

   Eliminate the parameter to obtain an equation in \( x \) and \( y \).

7. Express the Cartesian coordinates \((-1, \sqrt{3})\) in polar coordinates in three different ways.

8. Find the slope of the tangent line to the polar curve \( r = 8 \sin \theta \) at the point \((4, 5\pi/6)\).

9. Find all points where the polar curve \( r = 3 + 5 \sin \theta \) has a horizontal tangent line.
Alternating Series Estimation Theorem: If \( \sum (-1)^{k+1}b_k \) is a convergent alternating series such that \( 0 \leq b_{k+1} \leq b_k \) for all \( k \), then \( R_n \leq b_{n+1} \) for all \( n \).

Maclaurin Series for Some Common Functions:

\[
\frac{1}{1-x} = \sum_{k=0}^{\infty} x^k, \text{ for } |x| < 1 \text{ (Geometric Series)}
\]

\[
e^x = \sum_{k=0}^{\infty} \frac{x^k}{k!}, \text{ for } |x| < \infty
\]

\[
\sin x = \sum_{k=0}^{\infty} \frac{(-1)^k x^{2k+1}}{(2k+1)!}, \text{ for } |x| < \infty
\]

\[
\cos x = \sum_{k=0}^{\infty} \frac{(-1)^k x^{2k}}{(2k)!}, \text{ for } |x| < \infty
\]

\[
\ln(1 + x) = \sum_{k=1}^{\infty} \frac{(-1)^{k+1} x^k}{k}, \text{ for } -1 < x \leq 1
\]

\[
\tan^{-1} x = \sum_{k=0}^{\infty} \frac{(-1)^k x^{2k+1}}{2k+1}, \text{ for } |x| \leq 1
\]

Some Trigonometric Identities:

\[
\sin(2\theta) = 2 \sin \theta \cos \theta
\]

\[
\cos(2\theta) = \cos^2 \theta - \sin^2 \theta
\]