1. Find the radius and the interval of convergence of the power series
   a) $\sum_{n=1}^{\infty} \frac{(-1)^n}{n} (x + 4)^n$
   b) $\sum_{n=1}^{\infty} \frac{6 - n}{n} x^n$

2. Express the function as a power series
   a) $\frac{1}{1 - 2x}$
   b) $\frac{1}{(1 - 2x)^2}$
   c) $\frac{x^2}{(1 - 2x)^3}$

3. Find the Taylor series for $f(x) = \sin x$ at $a = \pi/2$. What is the radius of convergence of this series?

4. a) Approximate $f(x) = \ln(1 + 2x)$ by 3rd degree Taylor polynomial $T_3$ at $a = 1$.
   b) Use Taylor’s Inequality to estimate the accuracy of the approximation on the interval $0.5 \leq x \leq 1.5$.

5. For a certain power series $\sum c_n x^n$, it is known that $\sum c_n$ is convergent.
   a) If $\sum (-1)^n c_n$ is divergent, what can be said about the radius of convergence of this series?
   b) If $\sum (-2)^n c_n$ is divergent, what can be said about the radius of convergence?

6. If $a =< -3, -4, -1 >$ and $b =< 6, 2, -3 >$, find $|a|$, $a + b$, $3a + 4b$, $a \cdot b$, $\cos \theta$, and $a \times b$.

7. Find the unit vector in the direction of $a = 8i - j + 2k$.

8. Determine whether the given vectors are orthogonal, parallel or neither
a) \( \mathbf{a} = \langle 4, 6 \rangle, \mathbf{b} = \langle -3, 2 \rangle \)

b) \( \mathbf{a} = -\mathbf{i} + 2\mathbf{j} + 4\mathbf{k}, \mathbf{b} = 2\mathbf{i} - 4\mathbf{j} - 8\mathbf{k} \)

9. Find a unit vector orthogonal to \( \mathbf{i} + 2\mathbf{j} \) and \( \mathbf{j} + 2\mathbf{k} \).

10. Find the area of a parallelogram with vertices \( A(0, 1, 2) \), \( B(0, 2, 5) \), \( C(2, 7, 5) \) and \( D(2, 6, 2) \).