1. Determine whether the sum converges or diverges. Then state and show which convergence/divergence test you used.

   (a) $\sum_{n=1}^{\infty} \frac{4n}{5n+1}$

   (b) $\sum_{n=0}^{\infty} \frac{4n}{n^2+n+1}$

   (c) $\sum_{n=0}^{\infty} \frac{4}{n^2+3n+2}$

   (d) $\sum_{n=0}^{\infty} \frac{2 \cdot 7^n}{5 \cdot 3^{2n}}$

   (e) $\sum_{n=0}^{\infty} \frac{4}{n \cdot 2^n}$

   (f) $\sum_{n=0}^{\infty} \frac{4}{n}$

   (g) $\sum_{n=1}^{\infty} \frac{e^{1/n}}{n^2}$

   (h) $\sum_{n=0}^{\infty} \frac{4^n}{3n!}$

   (i) $\sum_{n=0}^{\infty} \frac{3n!}{4^n}$

   (j) $\sum_{n=1}^{\infty} \frac{(-1)^n}{5n}$

   (k) $\sum_{n=1}^{\infty} \frac{(-1)^n 3n}{5n}$

2. Evaluate the follow sum.

   (a) $\sum_{n=0}^{\infty} \frac{2}{5}\left(\frac{-4}{7}\right)^n$

   (b) $\sum_{n=0}^{\infty} \frac{2 \cdot 7^n}{5 \cdot 3^{2n}}$

   (c) $\sum_{n=0}^{\infty} \frac{6 \cdot 3^n}{n!}$

(d) $\displaystyle\sum_{n=0}^{\infty} \frac{4}{n^2+5n+4}$

(e) $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n}{5n!}$

(f) $\displaystyle\sum_{n=2}^{\infty} 6\left(\frac{7}{8}\right)^n$

(g) $\displaystyle\sum_{n=1}^{\infty} 6\left(\frac{9}{10}\right)^n$

3. Determine the radius and interval of convergence of the series given.

   (a) $\displaystyle\sum_{n=1}^{\infty} \frac{(2x-5)^n}{n}$

   (b) $\displaystyle\sum_{n=0}^{\infty} \left(\frac{2x}{5}\right)^n$

   (c) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n x^{2n}}{(2n)!}$

   (d) $\displaystyle\sum_{n=0}^{\infty} \frac{x^n}{n!}$

4. Determine the Taylor Series of the function $f(x) = \ln x$ about $x = 1$.

   (a) What is the interval of convergence?

   (b) What is the radius of convergence?

   (c) Write $\ln 2$ as an infinite series.

5. Determine the Taylor Series of the function $f(x) = \cos x$ about $x = 0$.

   (a) What is the interval of convergence?

   (b) What is the radius of convergence?

6. Determine the Taylor Series of the function $f(x) = \sin x$ about $x = 0$.

7. Determine the Taylor Series of the function $f(x) = \sqrt{1+x}$ about $x = 0$.

8. Determine the Taylor Series of the function $f(x) = \sqrt[3]{1+x}$ about $x = 0$.

9. Determine the Taylor Series of the function $f(x) = \sqrt[4]{1+x}$ about $x = 0$.