1. Evaluate the following:
   
   a) \[ \int \tan^5(x) \sec^2(x) \, dx \]
   
   b) \[ \int x \sin(3x) \, dx \]
   
   c) \[ \int \frac{2x+4}{x^3-2x^2} \, dx \]
2. Determine if the following integrals converge or diverge. If the integral converges, evaluate the integral.

   a) \( \int_1^\infty \frac{1}{x^4} \, dx \)

   b) \( \int_2^\infty \frac{x}{(x^2+1)^2} \, dx \)

   c) \( \int_1^2 \frac{1}{\sqrt{x-1}} \, dx \)

3. Use comparison to show whether the following converges or diverges.

   \( \int_4^\infty \frac{1}{x^2 \ln(x)} \, dx \)
4. a) Find the 4th-order Taylor Polynomial for \( f(x) = \ln(x+1) \) based on \( x_0 = 0 \).

b) Use your results from part (a) to estimate \( \ln(1.1) = \ln(0.1 + 1) \).

c) Taylor’s Theorem says that
\[
|f(x) - P_n(x)| \leq \frac{K_{n+1}}{(n+1)!}|x - x_0|^{n+1}
\]
for all values of \( x \) in an interval containing \( x_0 \). Using this result, what is the largest possible error that could have occurred in your estimate of \( \ln(1.1) \).
5. Does the following improper integral converge or diverge? If it converges, evaluate the integral.

\[ \int_0^{\pi/2} \tan(\theta) \, d\theta \]

6. Does the following improper integral converge or diverge? If it converges, evaluate the integral.

\[ \int_{-\infty}^{\infty} \frac{e^x}{2x + 1} \, dx \]

7. Evaluate: \( \int \sqrt{4 - x^2} \, dx \)