1a. Compute the indefinite integral
\[ \int x \cos x \, dx \]

1b. Use trigonometric substitution to compute the indefinite integral
\[ \int \frac{1}{x^2 + 1} \, dx \]

2. Assume \( z = \frac{1}{2} + \frac{\sqrt{3}}{2} i \).
   a. compute \( z^3 \).
   b. write \( z \) in polar form.

3. Compute
\[ \sum_{n=1}^{\infty} \frac{1 + (-3)^n}{5^n} \]

4. Find the power series for
\[ f(x) = \frac{1}{1 + 2x} \]
and determine the radius of convergence.

5. Does \( \sum_{n=1}^{\infty} \frac{n}{2^n} \) converge? Use ratio test to determine it.

6. Use Taylor series to show
\[ e = \sum_{n=0}^{\infty} \frac{1}{n!} \]

7. Find the polar equation for \((x - 1)^2 + y^2 = 1\)