1. Write out the first four terms of the Maclaurin series of $f(x)$ if

$$f(0) = 2,\ f'(0) = 3,\ f''(0) = 4,\ f^{(3)}(0) = 12$$

2. Find the terms through degree 4 of the Maclaurin series of $f(x) = \frac{\sin x}{1-x}$

3. Find the Taylor Series centered at $c = -1$ for $f(x) = e^{3x}$

4. Show that for $|x| < 1$ $\tan h^{-1} x = x + \frac{x^3}{3} + \frac{x^5}{5} + \ldots$

   Hint: $\frac{d}{dx} \tan h^{-1} x = \frac{1}{1-x^2}$

5. Let $F(x) = \int_0^x \frac{\sin t dt}{t}$. Show that

$$F(x) = x - \frac{x^3}{3 \bullet 3!} + \frac{x^5}{5 \bullet 5!} - \frac{x^7}{7 \bullet 7!} + \ldots$$

Evaluate $F(1)$ to three decimal places.

6. Express the definite integral below as an infinite series and find its value. (Expand the infinite series to 4 terms to find the value.)

$$\int_0^1 \cos(x^2) dx$$