Taylor and Maclaurin Series

1. Find the Maclaurin series of the function $\sin(x)$.

2. (a) Find the Maclaurin series of the function e^x.

   (b) Find the Taylor series of the function e^x centered at 1.

3. Show that the Maclaurin series of $\sin(x)$ is a power series representation for $\sin(x)$ which is valid for all values of x.

4. Find the Maclaurin series of the function $\cos(x)$. Is it a power series representation for $\cos(x)$?

5. Find the sum of the power series $\displaystyle\sum_{i=1}^{\infty}(-1)^{n-1}\frac{1}{n \cdot 2^n}$

6. (a) Find a power series representation of $f(x) = x \sin(x)$.

   (b) What is $f^{(31)}(0)$?

   (c) What is $f^{(32)}(0)$?

7. (a) Find a power series representation of $f(x) = \cos(x^6)$.

   (b) What is $f^{(100)}(0)$?

   (c) What is $f^{(96)}(0)$?