Workshop Exercises: Infinite Series II

1. Find a power series representation of the function and determine the radius of convergence.

   a) $f(x) = \frac{1}{1+x}$.

   b) $f(x) = \frac{x}{1-4x^2}$.

   c) $f(x) = \frac{1}{3+2x}$.

   d) $f(x) = \frac{1}{(1+x)^2}$ (Hint: differentiate the function in (a))

   e) $f(x) = \frac{x}{(1+x)^3}$.

   f) $f(x) = x\ln(1 + x)$.

2. Approximate $\int_0^{.25} x\tan^{-1} x\, dx$ to 6 decimal places.

3. Find the Maclaurin series for $f(x) = \cos 2x$ using the definition of a Maclaurin series, and show that the radius of convergence is ∞.

4. Find the Taylor series for $f(x) = \ln x$ centered at $a = 2$.

5. Use known Maclaurin series to obtain a Maclaurin series for the given function.

   a) $f(x) = \sin x^2$.

   b) $f(x) = x\,e^{-x}$.

6. Evaluate the indefinite integral $\int \frac{\cos x}{x}\, dx$ as an infinite series.

7. Use the binomial series to find the first four terms of the Maclaurin series of $f(x) = \sqrt{4 + x^2}$.