Exam 3 Review

1) Determine whether the series is absolutely convergent, conditionally convergent, or divergent.

(a) $\sum_{n=0}^{\infty} \frac{7^n}{n!}$ (b) $\sum_{n=0}^{\infty} \frac{(-1)^n}{3n+1}$ (c) $\sum_{n=0}^{\infty} \left(\frac{3n^2-5}{n^2+1}\right)^n$

(d) $\sum_{n=0}^{\infty} n\left(\frac{1}{2}\right)^n$ (e) $\sum_{n=2}^{\infty} \frac{(-1)^n}{n \ln(n)}$

2) Find the radius of convergence and the interval of convergence of the series:

(a) $\sum_{n=1}^{\infty} \frac{x^n}{n 3^n}$ (b) $\sum_{n=0}^{\infty} \frac{(x-2)^n}{n^2+1}$ (c) $\sum_{n=1}^{\infty} n^n \cdot x^n$ (d) $\sum_{n=0}^{\infty} \frac{x^n}{n!}$

3) Find a power series representation for the function and determine the radius of convergence.

(a) $f(x) = \frac{5}{1-4x^2}$ (b) $f(x) = \frac{1}{x+7}$ (c) $f(x) = \frac{1}{4+2x^2}$

4) (a) Find the Maclaurin series for $f(x) = \frac{1}{\sqrt{1-x^2}}$. (Hint: Use binomial series)

(b) Use part (a) to find the Maclaurin series for $\arcsin x$.

5) (a) Find the Taylor series for $f(x) = \ln x$ centered at $a = 1$

(b) Find the radius of convergence of this Taylor series.

6) Use the Maclaurin series for $\cos x$ to compute $\cos(5°)$ to within an error of 0.00001.

7) (a) Approximate $f(x) = \frac{1}{x^2}$ by a Taylor polynomial of degree 3 at the number $a = 1$

(b) Use Taylor's Formula to estimate the accuracy of the approximation $f(x) \approx T_2(x)$ when $0.9 \leq x \leq 1.1$.