Math 141-004 Exam III

1. Use Ratio test to determine the convergence of
   
   (a) \(\sum_{n=1}^{\infty} \frac{n^n}{(n+1)!}\)
   
   (b) \(\sum_{n=0}^{\infty} \frac{7^n}{n!}\)

2. Determine whether the following series converges conditionally or absolutely, or diverges.
   
   (a) \(\sum_{n=1}^{\infty} \frac{(-1)^{n+3}n^2}{(n+3)^2}\)
   
   (b) \(\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}\)
   
   (c) \(\sum_{n=1}^{\infty} \frac{(-1)^n}{\ln(n+1)}\)

3. Find a power series centered at \(c\) of the following functions:
   
   (a) \(f(x) = \frac{1}{2-x}, \quad c = 3\) \hspace{1cm} (b) \(g(x) = \frac{4}{x+5}, \quad c = 0\)
   
   (c) \(h(x) = \sin(3x), \quad c = 0\)

4. Find the third degree Maclaurin polynomial of \(f(x) = \tan(5x)\).

5. Find the intervals of convergence of the following power series
   
   (a) \(\sum_{n=0}^{\infty} \frac{n(x - 2)^n}{7^n}\)
   
   (b) \(\sum_{n=0}^{\infty} \frac{2^{n-1}x^n}{n!}\)