MATH141(0332/0342) Calculus II Fall 2009

Worksheet 11, Section 9.7-9.9 Name: ____________________

1. (*8 points*) Determine whether the series converge absolutely, converge conditionally or diverge.

(1) $\displaystyle\sum_{n=1}^{\infty}(-1)^n\frac{1}{\sqrt{n+5}}$

(2) $\displaystyle\sum_{n=1}^{\infty}\frac{\sin n}{n^2+1}$

(3) $\displaystyle\sum_{n=1}^{\infty}(-1)^{n+1}\frac{1}{(\ln n)^{1/n}}$

(4) $\displaystyle\sum_{n=1}^{\infty}(-1)^n\frac{1\cdot 3\cdot 5\cdots(2n+1)}{2\cdot 5\cdot 8\cdots(3n+2)}$

2. (*2 points*) Find an upper bound of the 10th truncation error E_{10} of $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{1}{n!}$

3. (*6 points*) Find the interval of convergence of the given series

(1) $\displaystyle\sum_{n=1}^{\infty}\frac{1}{\sqrt{n}3^n}x^n$

(2) $\displaystyle\sum_{n=1}^{\infty}\frac{\ln n}{n^2}x^n$

(3) $\displaystyle\sum_{n=1}^{\infty}\frac{n!}{n^n}x^n$

4. (*2 points*) Find the sum of the following series.

(1) $\displaystyle\sum_{n=3}^{\infty}\frac{1}{(n-2)!}$

(2) $\displaystyle\sum_{n=0}^{\infty}(-1)^n\frac{1}{2n+1}$

5. (*2 points*) Given the Taylor series of $cos(x)$ to be

$$cos(x) = \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n)!} x^{2n} = 1 - \frac{x^2}{2} + \frac{x^4}{24} - \frac{x^6}{720} + \cdots$$

We approximate the value of $cos(1)$ by $1 - \frac{1}{2} + \frac{1}{24} = \frac{13}{24}$. Use Lagrange Remainder Formula to give an explicit numerical upper bound of the error of this approximation.
Hint: $1 - \frac{1}{2}x^2 + \frac{1}{24}x^4$ is the 5^{th} Taylor polynomial of $cos(x)$ around point 0. So, you should find an upper bound of $r_5(1)$.