CALCULUS II ASSIGNMENT 8

DUE MARCH 28, 2019

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

(i) $\sum_{n=1}^{\infty} \frac{n}{7^n}$,

(ii) $\sum_{m=1}^{\infty} \frac{(-1)^m}{6m+2}$,

(iii) $\sum_{k=1}^{\infty} (-1)^k \frac{k}{\sqrt{k^3+3}}$,

(iv) $\sum_{n=1}^{\infty} \frac{n!}{n^n}$,

(v) $\sum_{r=1}^{\infty} \left(1+\frac{1}{r}\right)^{r^2}$,

(vi) $\sum_{m=1}^{\infty} \frac{(-1)^m}{\log(m)}$.

2. Test the series for convergence or divergence. Use any method available to you.

(i) $\sum_{n=1}^{\infty} \frac{2^n n!}{(n+2)!}$,

(ii) $\sum_{k=1}^{\infty} \left(\frac{1}{k^3}+\frac{1}{4^k}\right)$,

(iii) $\sum_{\ell=1}^{\infty} \ell \sin(1/\ell)$,

(iv) $\sum_{m=1}^{\infty} \frac{(m!)^m}{m^{4m}}$,

(v) $\sum_{n=1}^{\infty} \frac{1}{n^{1+1/n}}$,

(vi) $\sum_{p=1}^{\infty} (\sqrt[p]{2}-1)$.

3. Find the radius of convergence and interval of convergence of the series.

(i) $\sum_{n=1}^{\infty} \frac{x^n}{2n-1}$,

(ii) $\sum_{k=1}^{\infty} (-1)^k \frac{x^{2k+1}}{(2k+1)!}$,

(iii) $\sum_{m=1}^{\infty} \frac{b^m}{\log(m)}(x-a)^m$ for $b>0$ fixed,

(iv) $\sum_{n=1}^{\infty} \frac{x^n}{n!}$.

4. The Bessel functions of order 0 and 1 are, respectively,

$$J_0(x) := \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(n!)^2 2^{2n}} \quad \text{and} \quad J_1(x) := \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{n!(n+1)!2^{2n+1}}.$$

Find the radii and intervals of convergence of these functions.