Math 21C
Kouba
Practice Exam 3

1.) Determine whether each of the following series converges or diverges. Clearly state the name of the series test that you use.

a.) $\displaystyle\sum_{n=1}^{\infty} \frac{2^{n+1}}{n!}$ b.) $\displaystyle\sum_{n=2}^{\infty} \frac{3^n}{2^n + 3^n}$ c.) $\displaystyle\sum_{n=1}^{\infty} \frac{1 + 2(-1)^n}{n^2}$

d.) $\displaystyle\sum_{n=2}^{\infty} \frac{n^2 - 1}{n^2 + 4}$ e.) $\displaystyle\sum_{n=3}^{\infty} \frac{1}{n\sqrt{\ln n}}$ f.) $\displaystyle\sum_{n=2}^{\infty} \frac{n^3 + 2n^2 - 1}{4n^4 + 2n + 200}$

g.) $\displaystyle\sum_{n=1}^{\infty} \frac{n^6}{8^{n+1}}$ h.) $\displaystyle\sum_{n=2}^{\infty} (-1)^{n+1} \frac{n}{(n+5)^2}$ i.) $\displaystyle\sum_{n=2}^{\infty} \frac{3}{n^{\sqrt{3}}}$

j.) $\displaystyle\sum_{n=2}^{\infty} \frac{(2(n+1))!}{(3n)!}$ k.) $\displaystyle\sum_{n=2}^{\infty} \left[(1.1)^n + (0.9)^n\right]$

2.) The series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2 + 4}$ converges. What should n be in order that the partial sum $\displaystyle S_n = \sum_{i=1}^{n} \frac{1}{i^2 + 4}$ estimate the exact value of the series with error at most 0.00001 ?

3.) The series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n}$ diverges, i.e., $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n} = \infty$. What should n be in order that the partial sum $\displaystyle S_n = \sum_{i=1}^{n} \frac{1}{i}$ be greater than 200 ?

4.) Find the exact value of the following convergent series :
$\displaystyle\frac{4}{9} - \frac{8}{27} + \frac{16}{81} - \frac{32}{243} + \frac{64}{729} - \cdots$

5.) Use a geometric series to convert the decimal number $0.3434343434\cdots$ to a fraction.