Math 21C DHC
Kouba
Discussion Sheet 7

1.) Use any method to test each of the following series for convergence or divergence.

a.) $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n - \ln n}$ b.) $\displaystyle\sum_{n=2}^{\infty} \frac{\ln n}{n^2}$ c.) $\displaystyle\sum_{n=2}^{\infty} \frac{\ln n}{n^{1.2}}$ d.) $\displaystyle\sum_{n=2}^{\infty} \frac{\ln n}{n^{0.8}}$ e.) $\displaystyle\sum_{n=2}^{\infty} \frac{\ln n}{n}$.

f.) $\displaystyle\sum_{n=2}^{\infty} \left(\frac{\ln n}{n}\right)^2$ g.) $\displaystyle\sum_{n=2}^{\infty} \left(\frac{\ln n}{n}\right)^3$ h.) $\displaystyle\sum_{n=2}^{\infty} \frac{(\ln n)^7}{n^5}$ i.) $\displaystyle\sum_{n=1}^{\infty} \frac{n^n}{10^n n!}$

j.) $\displaystyle\sum_{n=1}^{\infty} \frac{3^{n-1}((n+1)!)^2}{n^{10}(2n)!}$ k.) $\displaystyle\sum_{n=2}^{\infty}(-1)^{n+1} \frac{n+8}{n^2+1}$ l.) $\displaystyle\sum_{n=1}^{\infty}(-1)^{n+1} \frac{n^2+1}{n^2+8}$

m.) $\displaystyle\sum_{n=1}^{\infty} \frac{2 + 3(-1)^n}{\sqrt{n + n^2}}$ n.) $\dfrac{1}{1^2} - \dfrac{2}{2^2} + \dfrac{3}{3^2} + \dfrac{1}{4^2} - \dfrac{2}{5^2} + \dfrac{3}{6^2} + \dfrac{1}{7^2} + \dfrac{2}{8^2} - \dfrac{3}{9^2}$

$+ \dfrac{1}{10^2} + \dfrac{2}{11^2} + \dfrac{3}{12^2} + \dfrac{1}{13^2} - \dfrac{2}{14^2} + \dfrac{3}{15^2} + \cdots$

o.) $\displaystyle\sum_{n=1}^{\infty} (n^{1/n} - 1)^n$ p.) $\displaystyle\sum_{n=1}^{\infty} \frac{(n!)^2}{(2n)!\ 2^{n^2}}$

2.) The series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2 + 1}$ converges. What should n be in order that the partial sum

$S_n = \displaystyle\sum_{i=1}^{n} \frac{1}{i^2 + 1}$ estimate the exact value of the series with error at most 0.001 ?

3.) The alternating series $\displaystyle\sum_{n=1}^{\infty}(-1)^{n+1} \frac{1}{n^2 + 1}$ converges. What should n be in order that

the partial sum $S_n = \displaystyle\sum_{i=1}^{n}(-1)^{n+1} \frac{1}{i^2 + 1}$ estimate the exact value of the series with error
at most 0.001 ?

4.) Use any method to test each of the following series for convergence or divergence.

a.) $\displaystyle\sum_{n=1}^{\infty} \left(\frac{n^2}{n^2 + 1}\right)^n$ b.) $\displaystyle\sum_{n=1}^{\infty} \frac{n^{n+1/n}}{(n + 1/n)^n}$

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