MAT21C
Homework 3 (Assigned on April 15, 2009).

Please try to do as many problems as you can. Some of the problems from this homework may appear on the Quiz 1.

Problem 0.

Please do Problem 7 parts d)-g) and Problem 8 from the Homework 2 if you have not done them already. For your convenience, I list the formulations of these problems below:

Which of the following series converge and which diverge? Give reasons for your answers.

d) $\sum_{n=1}^{\infty}(-1)^n \frac{5}{(\ln n)^{1/3}+3}$

e) $\sum_{n=1}^{\infty}(-1)^{n^2} \frac{\cos n}{n^{4/3}}$

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

g) $\sum_{n=1}^{\infty}(-1)^n \frac{\ln n}{2n-\ln n}$

and

Problem 58 from page 777.

Problem 1.

Which of the following series converge, and which diverge? Give reasons for your answers.

a) $\sum_{n=1}^{\infty}(-1)^n \frac{1}{n+2009}$

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

c) $\sum_{n=1}^{\infty}(-1)^n (1+1/n)^{-n}$

d) $\sum_{n=1}^{\infty}(-1)^n \sin(1/n)$

e) $\sum_{n=4}^{\infty}(-1)^n n^3 e^{-n}$

f) $\sum_{n=1}^{\infty}(-1)^n \frac{n-3}{2009n+1}$

Problem 2.

Estimate the magnitude of the error involved in using the sum of the first five terms to approximate the sum of the entire series.

a) $\sum_{n=1}^{\infty}(-1)^{n+1} \frac{1}{n^2+9}$

b) $\sum_{n=1}^{\infty}(-1)^n \frac{1}{2^n-1}$

c) $\sum_{n=1}^{\infty}(-1)^{n+1} \frac{(0.1)^n}{n^2}$

d) $\sum_{n=2}^{\infty}(-1)^{n-1}\frac{1}{n\ln n}$

Problem 3.

Problem 55 from page 777.

Problem 4.

Problem 61 from page 778.

Problem 5.

Find the radius and interval of convergence for the series given below. For what values of x does the series converge absolutely/conditionally?

a) $\sum_{n=1}^{\infty}(x-5)^n$

b) $\sum_{n=1}^{\infty}\frac{x^n}{n^{2/3}5^n}$

c) $\sum_{n=1}^{\infty}(1-3/n)^n(x+3)^n$

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

e) $\sum_{n=1}^{\infty}2^{\sqrt{\ln n}}x^n$

g) $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{x^n}{n+3}$

Problem 6.

Find the series' interval of convergence and, within the interval, the sum of the series as a function of x.

a) $\sum_{n=1}^{\infty}nx^n$

b) $\sum_{n=1}^{\infty}\frac{x^n}{n}$

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

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

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

f) $\sum_{n=1}^{\infty}n^2(x-3)^n$

Problem 7.

Problem 42 from page 788.

Problem 8.

Problem 43 from page 789.

Problem 9.

Problem 46 from page 789.