

## Midterm: Some problems for review

The exam will be held at the Testing Center (Zabel Hall 112) from Monday 5/8 to Wednesday 5/10. The material covered is Section 8.1 - 8.6. It is a closed book exam. A 4" x 6" handwritten single-sided note card is allowed. A scientific calculator is allowed (*and you will need it!*) Graphing/programmable/ transmittable calculators are not allowed.

You should review the homework problems, the examples given in the textbook and in the lectures. It is always a good idea to study for the exam with someone. The types of problems you may be asked on the exam include:

- Find the exact value of a convergent geometric series.
- Determine if a series converges or diverges using the convergent tests: Comparison test, Integral test, Alternative series test, Ratio test, Root test.
- Find the center, radius of convergence, and interval of convergence of a power series.
- Represent some functions as a power series.
- Apply power series to approximate a definite integral.

Additional problems to practice:

1) Find the exact value of the geometric series  $-\frac{1}{4} + \frac{1}{8} - \frac{1}{16} + \frac{1}{32} - \dots$

2) Determine if each of the following series converges or diverges.

(a)  $\sum \frac{1}{2n-1}$

(b)  $\sum \frac{n}{\ln(n+2)}$

(c)  $\sum \frac{n}{3n^3-2}$

(d)  $\sum \frac{(-1)^n}{n!}$

(e)  $\sum (-1)^n \left(\frac{n+1}{2n+1}\right)^n$

3) Find the center, radius of convergence, and interval of convergence of the following power series.

(a)  $\sum \frac{x^n}{n^2+n}$

(b)  $\sum \frac{(2x-1)^n}{n(3^n)}$

4) Represent the following functions as a power series centered at 0.

(a)  $\frac{3}{5+2x^2}$

(b)  $\frac{x}{x^2+x-2}$

5) Express the integral

$$\int_0^1 \frac{1}{x^4+2} dx$$

as a power series. Then approximate it by the 4th partial sum of the series.