The test is over sections 11.6, 11.8, 11.9, 11.10 in Chapter 11, 8.1, and 10.1-10.4 in chapter 10. and and 112.3 - 12.10 and 12.12. Topics include:

1. Convergence tests for series: absolute, ratio, and root tests for convergence.
2. Power Series: finding the radius, interval of convergence, differentiating and integrating power series, finding Taylor and Maclaurin Series, Taylor Polynomials, Taylor's inequality and its usage in determining whether a Taylor series converges.
3. Paramentric equations and polar coordinates: finding tangent lines and the length of curves in parametric or polar form, plotting points and graphing in polar coordinates, areas of regions bounded by polar curves.

As usual going over the quizzes, suggested homework problems, class and recitation notes, should be a good review. The following problems at the end of Chapter 11 and Chapter 10 are also a good review for the test. Chapter 11, page 758, Concepts Check: 5 (f),(g),9,11. True-False Quiz: 7,13. Exercises, 17,19,23,25,41,43,45,47,49,51,53,55,59.
Chapter 10, Concept Check: 1,3(a),5. True-False Quiz: 3,5,7. Exercises: 1,3,5,7,9,11,13,17, 21,23,29,31,33,35,37,39.

Homework Problems from which homework quizzes will be taken for the rest of the semester follow:

Section 9.1 (page 571) (possible HW quiz questions) 1,3,5,9.
Section 9.1 (page 571) (additional problems) 7,11,13.
Section 9.2 (page 578) (possible HW quiz questions) 3,5,19.
Section 9.2 (page 578) (additional problems) 1,7,23.
Section 9.3 (page 586) (possible HW quiz questions) 1,5,9,13,17,29,33,41,43.
Section 9.3 (page 586) (additional problems) 3,7,11,15,19,21,31,35,39.
Section 9.4 (page 598) (possible HW quiz questions) 5,7,19 (a).
Section 9.4(page 598) (additional problems) 9,13,17.

Here are two practice tests with answers.

Practice Test 1

25 pts 1. Given the power series, $P(x) = \sum_{n=1}^{\infty} \dfrac{x^n}{2^n\, n(n+1)}$.
(a) Find the radius and open interval of convergence of this series.
(b) Find $P^{(5)}(0)$.
(c) Where does $P'(x)$ exist and what is $P'(x)$ equal to ?
(d) Express $\int_{-1}^{1} P(x)dx$ as the sum of a certain infinite series.

25 pts 2. (a) Find the Taylor series expansion of $\sin x$ about $x = \pi/2$.
(b) Use Taylor's inequality to show that your series converges to $\sin x$ for $-\infty < x < \infty$.

25 pts 3. Given the curve C with parametric equations, $y = e^t + e^{-t}$, $x = 1 - 2t$, $- \leq t \leq 1$.
(a) Find the tangent line to this curve at the point corresponding to $t = 0$.
(b) Find the length of C.

25 pts 4. Given polar coordinates, r, θ, and the double angle formulas, $\cos^2\phi = (1/2)(1 + \cos 2\phi)$, $\sin^2\phi = (1/2)(1 - \cos 2\phi)$.
(a) Sketch the polar curves, $r = 1$ and $r = 1 - \sin\theta$. Indicate the coordinates of points of intersection on your graph.
(b) Find the area of the region which lies inside of $r = 1 - \sin\theta$ and outside of $r = 1$.

10 pts EC. Given that $\dfrac{e^{2x}}{\cos x} = a + bx + cx^2 + \ldots +$ (higher terms in x), has a Maclaurin expanision about $x = 0$. Find a, b, c.

Answers Practice Test 1

1. (a) Radius = 2, open interval of convergence = (- 2, 2).
(b) $P^{(5)}(0) = 1/8$.
(c) $P'(x) = \sum_{n=1}^{\infty} \frac{x^{n-1}}{2^n(n+1)}$ converges on (- 2, 2).
(d) $\int_{-1}^{1} P(x)dx = \sum_{n=1}^{\infty} \frac{1+(-1)^n}{2^n\, n(n+1)^2}$.

2. (a) $\sin x = \sum_{n=0}^{\infty} \frac{(-1)^n(x-\pi/2)^{2n}}{(2n)!}$.
(b) $|\sin x - T_n(x)| \leq \frac{|x-\pi/2|^{n+1}}{(n+1)!} \to 0$ as $n \to \infty$, so series converges to $\sin x$.

3. (a) $y = 2$.
(b) $2(e - e^{-1})$.

4. (a) Can sketch in class if asked. Points of intersection are $x = \pm 1, y = 0$.
(b) Area $= 2 + \pi/4$.

EC . $e^{2x}/\cos x = 1 + 2x + 5x^2/2 + \ldots +$ so $a = 1, b = 2, c = 5/2$.

Practice Test 2

25 pts 1. Given that $e^w = \sum_{n=0}^{\infty} \dfrac{w^n}{n!}$ for $-\infty < w < \infty$.
(a) Use this fact to find the Maclaurin expansion for e^{-4x^2}. Where does the this series converge?
(b) Express $\int_0^{1/2} e^{-4x^2}dx$ as an alternating series.
(c) If S_k denotes the k th partial sum of the series in (b), estimate $|\int_0^{1/2} e^{-4x^2}dx - S_5|$. Justify your reasoning.

25 pts 2. Given $\sum_{n=0}^{\infty} x^n = (1 - x)^{-1}$ when $|x| < 1$. Find a Maclaurin series expansion for $(1 - x^3)^{-3}$ and $\ln(1 - 3x^2)$ about $x = 0$.

50 pts 3. Given the curve $r = e^\theta, 0 \leq \theta \leq 2\pi$, where r, θ are polar coordinates.
(a) Find the tangent line to this curve when $\theta = \pi$.
(b). Find the length of this curve,
(c) Find the area of the region bounded by this curve and the polar axis.

10 pts EC. (a) Find the Taylor polynomial of degree 4 (T_4) corresponding to $\cos x$ and $a = 0$.
(b) Use Taylors inequality to estimate how close this polynomial approximates $\cos x$ on [- .1, .1] ?

Answers Practice Test 2

1. (a) $e^{-4x^2} = \sum_{n=0}^{\infty} \frac{(-1)^n \, 2^{2n} \, x^{2n}}{n!}$ for $-\infty < x < \infty$.

(b) $\int_0^{1/2} e^{-4x^2} \, dx = \sum_{n=0}^{\infty} (1/2) \frac{(-1)^n}{(2n+1)n!}$.

(c) $|\int_0^1 e^{-x^2} dx - S_5| \leq \frac{1}{(11)5!} = \frac{1}{1320}$ by the error estimate for an alternating series satisfying the conditions of the alternating series test.

2. (a) $(1-x^3)^{-3} = (1/2)\sum_{n=0}^{\infty} (n+1)(n+2)x^{3n}$.

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

3. (a) $y = x + e^{\pi}$.
(b) Length $= \sqrt{2}\,(e^{2\pi} - 1)$.
(c) Area $= (1/4)(e^{4\pi} - 1)$.

EC. (a) $T_4(x) = 1 - x^2/2 \, + \, x^4/24$.
(b) within $(.1)^5/120$.