MAC 2312 Summer B 2004
Review Sheet Prof. S. Hudson

The final exam will be Thursday, August 12, 11:00 to 12:40pm. It will cover the entire course. About half covers topics after Exam 3 (HW6 and 7, Chs 9 and 10). It will probably review some weak points from Exam 3 such as convergence tests and improper integrals.

Remember that no incompletes will be given, except for emergencies. Settle any unfinished business (such as late HW) with me by Wednesday 8/11/04.

A. Suggested Review

1) Look over all the HW problems from Chs 9 and 10, until you are sure you can handle any similar problems. Include the Ch 9.3 and 9.4 problems, which are not to hand in. Note pages 769-770, especially problems 16-44.

2) Memorize the Taylor series highlighted in the text including: page 704 (1), pages 711-714, (19), (21), (22), (27), page 746 (14) and page 748 (19). This is easier if you focus on patterns and similarities. From this base, you should be able to quickly find the series for examples like $f(x) = \sin(2x)$, etc.

3) Know and be able to use Taylor's formula for $R_n(x)$, as done in class. For showing convergence, see Examples 5-6 on page 710. I cannot find any HW exercises in the text like these. For error estimation, see Example 7 on page 757 (you may need a calculator, but not a graphing one). See exercises 29-40 in Ch 10.9. Think about when to use R_n, or the A.S.thm, or ρ (the Ratio Test).

4) A rough guide to Ch 9: omit 9.1, know the highlighted formulas in 9.2-3 (know which formulas go with roses, cardioids, etc) and know the parts of 9.4 covered in class (expect some announcement in class). Practice problems like 25-36 in Ch 9.3.

5) Main proofs and explanations to know:

Page 352 eqn (7) (FTC, Part I)
Page 411 eqn (5) (Disk method)
Page 707, eqn (7) (the formula for the Taylor coeff's)
Page 640, eqn (1) (polar area formula).

6) Earlier topics. Review Chs 5-7 and HWs 1-5 as needed (I'd expect about a day or so of this should be enough). Check that you haven't forgotten any major definitions (eg, the integral, average value) or formulas (shells, ln/exp, Simpson's rule) or methods (trig integrals, partial fractions) etc.

B. Here are some sample problems that you can use for more practice. Some are (relatively hard) problems from old exams. There are more old exams on my web site.

1) Compute (or show that it diverges): $\int_0^\infty \sin(x)\ dx$

2) Compute:

$\int \frac{dx}{x^2+6x+5}$

$\int \sqrt{4-x^2}\ dx$

$\int \tan^{-1}(2x)\ dx$

$\int \sin^2(x)\cos^3(x)\ dx$

The volume: $y = 1/2 + x^2$ and $y = x$ over $x \in [0, 2]$, revolved around the x-axis.

3) Use the usual series for $\cos(x)$ to approximate $\cos(1)$ to four decimal-place accuracy (to within .00005). You can leave your answer as a sum (don't simplify it). Use the R_n formula to find the smallest allowable n. [Hints: 6!=720, 7!=5040, 8!=40320 9!=362,880].

4) Answer True or False:

The formula for the trapezoidal rule is $\frac{b-a}{2n}[y_0 + 2y_1 + \ldots + 2y_{n-1} + y_n]$.

The formula for arc length is $L = \int_a^b 2\pi x\sqrt{1+(f'(x))^2}\ dx$.

When we eliminate the parameter from the equations $x = 2t - 3$ and $y = 6t - 1$, we get that y is a linear function of x.

The series $1 - 1 + 1 - 1 + 1 - 1 + \ldots$ converges to 0.

The McLaurin series for $\sin x$ is $1 - x^2/2! + x^4/4! + \ldots$ and it converges for all real x.

If $\sum a_k$ converges absolutely then $\sum(-a_k)$ converges absolutely, too.

Every monotone sequence that is bounded above converges.

$f(x) = \ln(2x)$ has a McLaurin series.

The graph of $r = \cos(4\theta)$ is a 4-petal rose.

5) Sketch the curves and find formulas for the area. You don't have to compute the integrals.

A) The region inside the curve $r = 1 + \cos\theta$.

B) The region inside the curve $r = 4 + 4\cos\theta$ but outside of $r = 6$.

C) The region enclosed by the inner loop of the curve $r = 1 + 2\cos\theta$.

6) Use the left-endpoint rule with $n = 4$ to approximate the area described in 5)A).

7) How much work to pump the water over the top of the reservoir? It is cone-shaped with a 20 foot diameter at the top and is 15 feet deep. It is filled with water (62 lbs per cubic ft) to a depth of 10 feet.