Math 1AA Midterm 2 March 2006, STUDY GUIDE

The test covers the following material from chapters 9 and 11 of the textbook.

Chapter 9

    section 9.1

    section 9.2

    section 9.3 omit orthogonal trajectories and mixing problems

    section 9.4 is NOT on the test (this was covered in Math 1A), but you should be able to solve the exponential growth equation as an example of a separable equation

    section 9.5 the emphasis is on the method for analysing the logistic equation, rather than on details of the solution

Good review problems from p.645–647 of the textbook

    Concept Check: 1,2,3,4,5,7,8

    True/False: 1,2,3,4,7

    Problems: 1,2,3,5,7,19,21

Chapter 11

    section 11.1 to the end of p.707

    section 11.2

    section 11.8 omit the technique of using the ratio test to find the radius of convergence

    section 11.9

    section 11.10 omit multiplication and division of power series

    section 11.11

    section 17.4 Good review problems from p.786–788 of the textbook

    Concept check: 1, 3a, 8, 9, 10, 11, 12

    True/False: 1, 13

    Problems: 45, 47–54, 59, 61, 62 and p.1167 12

The list of formulas that you will be given is the following:

1) $\sin(2x) = 2\sin(x)\cos(x)$

2) $\cos^2(x) = \dfrac{1}{2}(1 + \cos(2x))$

3) $\sin^2(x) = \dfrac{1}{2}(1 - \cos(2x))$

4) $\displaystyle\int \sec(x)\ dx = \ln|\sec(x) + \tan(x)| + C$

5) $\displaystyle\int \sec^3(x)\ dx = \dfrac{1}{2}\sec(x)\tan(x) + \dfrac{1}{2}\ln|\sec(x) + \tan(x)| + C$

6) $\displaystyle\int \dfrac{1}{1 + x^2}\ dx = \arctan(x) + C$ 7) The Taylor series for the function $f(x)$

centered at a is given by

$$f(x) = \sum_{n=0}^{\infty} \frac{1}{n!} f^{(n)}(a)(x-a)^n.$$

If $|f^{(n+1)}(x)| \leq M$ for all $|x - a| \leq d$, then the nth remainder term satisfies
$|R_n(x)| \leq \dfrac{1}{(n+1)!} M |x - a|^{n+1}$.

8) $e^x = \sum_{n=0}^{\infty} \dfrac{1}{n!} x^n$; converges for all x.

9) $\cos(x) = \sum_{n=0}^{\infty} \dfrac{1}{(2n)!} x^{2n}$; converges for all x.

10) $\sin(x) = \sum_{n=0}^{\infty} \dfrac{1}{(2n+1)!} x^{2n+1}$; converges for all x.

11) $(1+x)^r = \sum_{n=0}^{\infty} \dfrac{r(r-1)(r-2)\cdots(r-n+1)}{n!} x^n$; converges for $|x| < 1$.