

MA366 Exam 2 Study Sheet

Show all work. A correct answer without supporting work is worth NO credit! (Some calculators can solve differential equations.) You will not be asked to graph solutions on the test.

- (1) Find all **real** solutions to the following problems. *No complex numbers allowed!* If no initial conditions are given, give the general solution. Exercises 1-16, p. 144, 7-22, p. 163, 35-42, p. 165, 1-14, p. 171.
- (2) **Use the method of undetermined coefficients** (educated guessing) to find the general solution to the following non-homogeneous equations: Exercises 1-10, p. 183.
- (3) In using the method of undetermined coefficients to solve the following differential equations, give the form of the “guess” y_o for the particular solution *as explicitly as possible* without actually finding the coefficients. Thus, for example, for the equation $y'' + y = e^{2t}$ my answer would be $y_o = Ae^{2t}$. Exercises 1-3, 6,13, 16,17,18, p. 183
- (4) In each of the following problems you are given that $y_1(x)$ and $y_2(x)$ form a fundamental set of solutions for the given differential equation: Exercises 13-20, p. 189.
 - (a) The method of variation of parameters, as taught in class, requires the use of a system of two linear equations in two unknowns u'_1 and u'_2 of the form

$$\begin{aligned} au'_1 + bu'_2 &= c \\ du'_1 + eu'_2 &= f \end{aligned}$$

In the context of the given data, $a = ?, b = ?, c = ?, d = ?, e = ?, f = ?$ **Be explicit!**

- (b) Solve the system in 4a.
 - (c) Express y in terms of y_1, y_2, u_1, u_2 .
- (5) Exercises 5-7, 9-11, p. 202. I will not ask for quantities such as the period, quasi-period, frequency, etc. Just know how to find the displacement. You should also know how to determine if the motion is under damped, critically damped, or over damped and what implications this has for the motion, e.g. what would be the general form of the graph of the solution in each case.

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(6) p. 215, 5, 6, 7(a), 8(a), (b), 9 (no graph), 10, but not the times when $v = 0$, 11(a), 17(a),(b).