MAT282 Winter 2014 Exam 3 Mar 25 Name____

100 pts. Show your work. If you use your NSpire for a computation, make a note of that fact.

1. Consider the differential equation $y''+4y=2x$
   a. List the three properties of this equation that allow us to use the methods of Ch 5.
      i.
      ii.
      iii.

   b. Find two solutions to the complementary homogeneous equation

   c. Verify that your solutions in part b are linearly independent

   d. Find one particular solution to the non-homogeneous equation

   e. Form the general solution to the original DE

   f. Find the solution that satisfies the IC $y(0)=1, y'(0)=2$

2. Find a **particular** solution of the DE $4y''+4y'+y=3xe^{x}$.

3. Find a **particular** solution of $y''-4y=2e^{2x}$

4. Find a **particular** solution to $3y'' + y' - 2y = 2\cos x$.

5. Find a particular solution to the DE $x^2 y'' + 5xy' + 4y = \dfrac{1}{x^3}$

6. Solve the IVP $y''+9y=\sin 2x; y(0)=1, y'(0)=0$

MAT282 Winter 2014 Exam 3 Table Of Starting Points

Form Of f(x)	Form of y_p
Polynomial of degree m	$y_p = A + Bx + Cx^2 + \ldots + \_\_ x^m$
$ke^{\alpha x}$	$y_p = Ae^{\alpha x}$
$ke^{\alpha x}$, with duplication in y_c	$y_p = u(x)e^{\alpha x}$
$ke^{\alpha x}G(x)$, where G(x) is polynomial	$y_p = e^{\alpha x}Q(x)$ where Q(x) is polynomial of same degree
$P(x)\cos\omega x + Q(x)\sin\omega x$, where P, Q are polynomials	$\mathrm{A}(x)\cos\omega x + B(x)\sin\omega x$
$e^{\alpha x}(P(x)\cos\omega x + Q(x)\sin\omega x)$	$y_p = u(x)e^{\alpha x}$

1. When a is a root of the characteristic equation, an x must be multiplied into y_p
2. Recall that a general solution is given by $y_g = y_c + y_p; y_c = c_1 y_1 + c_2 y_2$
3. Know what the Wronskian is and what it represents.