MATH 261.005 NAME (print): _____
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SAMPLE TEST # 2

Solve the following exercises. **Show your work.** (No credit will be given for an answer with no supporting work shown.)

Ex. 1. Find the general solution for each of the following differential equations:

(a) $y'' + 10y' + 25 = 0$

(b) $y'' + 10y' + 25y = 0$

(c) $y'' + 10y' + 29y = 0$

(d) $y'' + 10y' + 24y = 0$

(e) $2y'' + 3y' + y = t^2 + 3\sin t$

Ex. 2. Solve the initial value problem $y'' + y' - 2y = 2t$, $y(0) = 0$, $y'(0) = 1$.

Ex. 3. Find a particular solution of the equation $y'' + 3y = 3\sin 2t$.

Ex. 4. Given that $y_1(x) = e^x$ is a solution of the ODE $(x-1)y'' - xy' + y = 0$, $x > 0$, use the method of reduction of order to find a second independent solution of this equation.

Ex. 5. Use **the variation of parameters method** to find a particular solution of the equation $y'' + 4y' + 4y = t^{-2}e^{-2t}$, $t > 0$. (No credit for the solution found by another method.)

Ex. 6. A mass weighing 2 lb stretches a spring 6 in. The mass is pushed down additional 3 in and released with an upward velocity of 0.7 ft/sec. There is a resisting force equivalent to 8 lb when the velocity is 11 ft/sec. There is no external force. What is the ODE that gives the displacement at any time and what are the initial values? (Do not solve the ODE.)