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Math 2150, Fall 2006, Quiz 7  
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- (4) 1. Find the general solution to the homogenous differential equation  $y'' - 3y' + 2y = 0$ .  
(3) 2. Find a particular solution to the inhomogenous differential equation  $y'' - 3y' + 2y = 4t$ .  
(3) 3. Find the solution to  $y'' - 3y' + 2y = 4t$  which satisfies  $y(0) = 8$  and  $y'(0) = -7$ .

1.  $y'' - 3y' + 2y = 0$   
 $r^2 - 3r + 2 = 0$   
 $(r-1)(r-2) = 0$   
 $r = 1 \text{ or } 2$

$$y = c_1 e^t + c_2 e^{2t}$$

2.  $y'' - 3y' + 2y = 4t$   
 $y = At + B$   
 $y' = A$   
 $y'' = 0$

$$\begin{aligned} 0 - 3A + 2(At + B) &= 4t \\ 2At + (2B - 3A) &= 4t \\ 2A &= 4 \quad A = 2 \\ 2B - 3A &= 0 \quad B = 3 \end{aligned}$$

$$y_p = 2t + 3$$

3.  $y = 2t + 3 + c_1 e^t + c_2 e^{2t}$

$$\begin{aligned} 8 &= y(0) = 3 + c_1 + c_2 \\ -7 &= y'(0) = 2 + c_1 + 2c_2 \end{aligned}$$

$$\begin{aligned} c_1 + c_2 &= 5 \\ c_1 + 2c_2 &= -9 \\ \hline c_2 &= -14 \\ c_1 &= 5 - c_2 = 19 \end{aligned}$$

$$y = 2t + 3 + 19e^t - 14e^{2t}$$