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Math 305 PRACTICE EXAM 3 Name_____

1. What is the general solution? (Review similar questions 4.2: 11–22)
   a) $y^{(4)} - 6y'' + 9y = 0$
   b) $y^{(4)} - 8y' = 0$
   c) $y''' + 2y'' - y' - 2y = 0$

2. Consider $y''' + y' = f(t)$
   a) Find the general solution for the corresponding homogeneous equation.
   b) What would you guess for a particular solution y_p when the method of undetermined coefficients is applied if (review similar questions 4.3: 13–18)
      i) $f(t) = t + 3$
      ii) $f(t) = 3e^{\frac{1}{2}t} \sin \dfrac{\sqrt{3}}{2} t$
      iii) $f(t) = 4e^t + e^{-t}$
      iv) $f(t) = \cos t + 2 \sin 2t$
      iv) $f(t) = \sin^2 t$

3. Solve the equation using variation of parameters. (Similar questions: 3.6: 1, 3, 7, 10, 13)

$$y'' + 4y' + 4y = t^{-2}e^{-2t} \quad (t > 0)$$

4. Solve the IVP. (Similar questions 4.3: 9–12)

$$\begin{aligned} 4y''' - y' &= 4t + 12e^{2t} \\ y(0) &= 0 \\ y'(0) &= 0 \\ y''(0) &= 0 \end{aligned}$$

5. Find all eigenvalues and eigenvectors for (Similar questions: 10.2: 14–19)

$$\begin{aligned} y'' - \lambda y &= 0 \\ y(0) &= 0 \\ y(6) &= 0 \end{aligned}$$