

Practice problems on Chapters 3 & 4

1. (10 pts) Find the general solution to

$$y'' + 4y' + 5y = 0.$$

2. (10 pts) Find the solution to

$$y'' + 5y' + 6y = e^{-t}$$

satisfying $y(0) = 0$ and $y'(0) = 0$.

3. (10 pts) Find the general solution to

$$y'' + 2y' + y = \sin 2t.$$

4. (20 pts) Given that $y = c_1t + c_2t^{-3}$ is the general solution to $t^2y'' + 3ty' - 3y = 0$ for $t > 0$, use the method of variation of parameters to find a particular solution to

$$t^2y'' + 3ty' - 3y = 16t.$$

5. (20 pts) $y = 1 = x^0$ is one solutions to

$$x^3y''' - 12xy' = 0$$

of the form x^r for $x > 0$. Find all solutions of this form. What is the general solution to this equation for $x > 0$? How do you *know* it is the general solution?

6. (20 pts) What is the correct FORM of a particular solution of

$$y^{(4)} - y''' - y'' + y' = t^2 + te^t$$

used in the method of undetermined coefficients?

Hint: $r^4 - r^3 - r^2 + r = r(r-1)^2(r+1)$

7. (10 pts) What is the general solution to

$$y^{(4)} - 16y = 0?$$