Worksheet 6
The Wronskian and the Method of Undertermined Coefficients

Find a basis for the space of solutions of each of the following ODEs. ($Hint$: Let $n$ be the order of the equation. First find $n$ distinct solutions $B = \{y_1, \ldots, y_n\}$, then use the Wronskian to establish that $B$ is a basis of the entire solution set.)

1. $y''' + y' = 0$
2. $y^{(4)} + 3y'' = 0$
3. $y''' + 2y'' - y' - 2y = 0$
4. $y^{(4)} + 2y''' + y'' = 0$
5. $ty''' - y'' = 0$ ($Hint$: 1, $t$, $t^2$ )
6. $t^3y''' + t^2y'' - 2ty' + 2y = 0$ ($Hint$: $t^{-1}$, $t$, $t^2$)

(From Boyce & DiPrima section 4.1. For slightly more practice, try problems 3.2 #1-6)
Find the general solution for $y(t)$.

7. $y'' - 2y' - 3y = 3e^{2t}$

8. $y'' + 2y' + 5y = 3\sin(2t)$

9. $y'' - y' - 2y = -2t + 4t^2$

10. $y'' + y' - 6y = 12e^{3t} + 12e^{-2t}$

11. $y'' - 2y' - 3y = -3te^{-t}$

12. $y'' + 2y' = 3 + 4\sin(2t)$

13. $y''' - y'' - y' + y = 2e^{-t} + 3$

14. $y^{(4)} - y = 3t + \cos(t)$

15. $y''' + y'' + y' + y = e^{-t} + 4t$

16. $y''' - y' = 2\sin(t)$

17. $y^{(4)} - 4y''' = t^2 + e^t$

18. $y^{(4)} + 2y'' + y = 3 + \cos(2t)$

19. $y^{(6)} + y''' = t$

20. $y^{(4)} + y''' = \sin(2t)$

(B&D 3.5, 4.3. For more practice, try 3.5 #15-20, 4.3 #9-12)