Supplemental Higher Order Linear Equations

1. $y''' - 4y'' - 25y' + 28y = 0$ **ANS:** $y(x) = c_1 e^{-4x} + c_2 e^x + c_3 e^{7x}$

2. $y''' - 6y'' - y' + 6y = 0$ **ANS:** $y(x) = c_1 e^x + c_2 e^{-x} + c_3 e^{6x}$

3. $y''' + 3y'' - 4y' - 12y = 0$ **ANS:** $y(x) = c_1 e^{-3x} + c_2 e^{-2x} + c_3 e^{2x}$

4. $y''' + 2y'' - 4y' - 8y = 0$ **ANS:** $y(x) = c_1 e^{-2x} + c_2 xe^{-2x} + c_3 e^{2x}$

5. $y''' - y' = 0$ **ANS:** $y(x) = c_1 + c_2 e^{-x} + c_3 e^x$

6. $y''' - y' = 0$ with $y(0) = 2$, $y'(0) = 3$, $y''(0) = -1$ **ANS:** $y(x) = 3 - 2 e^{-x} + e^x$

7. $y'''' + 4y'' = 0$ **ANS:** $y(x) = c_1 + c_2 x + c_3 \cos(2x) + c_4 \sin(2x)$

8. $y''' - 3y'' + 7y' - 5y = 0$ **ANS:** $y(x) = c_1 e^x + c_2 e^x \cos(2x) + c_3 e^x \sin(2x)$

9. $y''' - 4y'' + 7y' - 6y = 0$ **ANS:** $y(x) = c_1 e^{2x} + c_2 e^x \cos(\sqrt{2} x) + c_3 e^x \sin(\sqrt{2} x)$

10. $y''' - y'' + y' + 3y = 0$ **ANS:** $y(x) = c_1 e^{-x} + c_2 e^x \sin(\sqrt{2} x) + c_3 e^x \cos(\sqrt{2} x)$

11. $y''' + 2y'' + 5y' - 26y = 0$ **ANS:** $y(x) = c_1 e^{2x} + c_2 e^{-2x} \sin(3x) + c_3 e^{-2x} \cos(3x)$

12. $y^{(4)} + 13y'' + 36y = 0$ **ANS:** $y(x) = c_1 \sin(2x) + c_2 \cos(2x) + c_3 \cos(3x) + c_4 \sin(3x)$

13. $y^{(4)} + 8y'' + 16y = 0$ **ANS:** $y(x) = (c_1 + c_2 x) \sin(2x) + (c_3 + c_4 x) \cos(2x)$

14. $y^{(4)} + 4y''' + 7y'' + 6y' + 2y = 0$ **ANS:** $y(x) = c_1 e^{-x} + c_2 e^{-x} x + c_3 e^{-x} \sin(x) + c_4 e^{-x} \cos(x)$