Math 220 – Section 4.3 Solutions

1. The general solution to $y'' + 9y = 0$ is
$$y = c_1 \cos 3t + c_2 \sin 3t$$

3. The general solution to $z'' - 6z' + 10z = 0$ is
$$z = e^{3t}(c_1 \cos t + c_2 \sin t)$$

4. The general solution to $y'' - 10y' + 26y = 0$ is
$$y = e^{5t}(c_1 \cos t + c_2 \sin t)$$

9. The general solution to $y'' - 8y' + 7y = 0$ is
$$y = c_1 e^t + c_2 e^{7t}$$

13. The general solution to $y'' + 2y' + 5y = 0$ is
$$y = e^{-t}(c_1 \cos 2t + c_2 \sin 2t)$$

23. The general solution and its first derivative for the equation $w'' - 4w' + 2w = 0$ are:
$$\begin{aligned} w &= c_1 e^{(2+\sqrt{2})t} + c_2 e^{(2-\sqrt{2})t} \\ w' &= (2+\sqrt{2})c_1 e^{(2+\sqrt{2})t} + (2-\sqrt{2})c_2 e^{(2-\sqrt{2})t} \end{aligned}$$
Using the initial conditions $w(0) = 0$ and $w'(0) = 1$ we have:
$$\begin{aligned} c_1 + c_2 &= 0 \\ (2+\sqrt{2})c_1 + (2-\sqrt{2})c_2 &= 1 \end{aligned}$$
The solution is $c_1 = \frac{\sqrt{2}}{4}$, $c_2 = -\frac{\sqrt{2}}{4}$. Therefore,
$$\boxed{y = \frac{\sqrt{2}}{4} e^{(2+\sqrt{2})t} - \frac{\sqrt{2}}{4} e^{(2-\sqrt{2})t}}$$