Section 3.1, #10 Find the solution for the following initial value problem, sketch the graph of the solution and describe its behavior as $t$ increases:

$$y'' + 4y' + 3y = 0, \ y(0) = 2, \ y'(0) = -1$$

#18 Find a differential equation whose general solution is $y = C_1e^{-t/2} + C_2e^{-2t}$.

Section 3.2, #5 Find the Wronskian of $y_1(t) = e^t \sin(t)$ and $y_2(t) = e^t \cos(t)$.

#6 Find the Wronskian of $y_1(\theta) = \cos^2(\theta)$ and $y_2(\theta) = 1 + \cos(2\theta)$.

#27 Verify that the following functions $y_1$ and $y_2$ are solutions of the given differential equation. Do they constitute a fundamental set of solutions?

$$(1-x \cot(x))y''-xy'+y = 0, \ 0 < x < \pi; \ y_1(x) = x, \ y_2(x) = \sin(x)$$

Section 3.3, #11 Find the general solution of the following differential equation:

$$y'' + 6y' + 13y = 0$$

#20 Find the solution of the following initial value problem, sketch the graph of the solution and describe its behavior for increasing $t$:

$$y'' + y = 0, \ y(\pi/3) = 2, \ y'(\pi/3) = -4$$

#35 Use the substitution $x = \ln(t)$ to solve the following differential equation

$$t^2y'' + ty' + y = 0$$

Section 3.4, #8 Find the general solution of the following differential equation:

$$16y'' + 24y' + 9y = 0$$

#12 Solve the following initial value problem, sketch the graph of the solution and describe its behavior for increasing $t$:

$$y'' - 6y' + 9y = 0, \ y(0) = 0, \ y'(0) = 2$$
Section 3.5, Find the general solution of the following differential equations:

#7
\[ 2y'' + 3y' + y = t^2 + 3\sin(t) \]

#9
\[ u'' + \omega_0^2 u = \cos(\omega t), \quad \omega^2 \neq \omega_0^2 \]