1. (4 points) (from ch. 2.2.2, ex 2) Solve the equation

\[4y'' - 12y' + 9y = 0.\]

**Solution:**

\[y = (c_1 + c_2 t)e^{3t/2}.\]

2. (4 points) (from ch. 2.2.2, ex 4) Solve the equation

\[4y'' - 4y' + y = 0,\]

with the condition \(y(0) = 0, y'(0) = 3.\)

**Solution:**

\[y = 3te^{t/2}.\]

3. (4 points) (from ch. 2.2.2, ex 20) Solve the equation

\[t^2y'' - ty' + y = 0.\]

**Solution:**

\[y = c_1 t + c_2 t \ln(|t|).\]

(you need to use the variation of the parameter (that is: reduction of order) to get the second solution \(t \ln(|t|)).\)

4. (4 points) (from ch. 2.4, ex 6) Solve the equation

\[y'' + 4y' + 4y = t^{5/2}e^{-2t},\]

with \(y(0) = 0\) and \(y'(0) = 0.\)

**Solution:**

\[y = \left(c_1 + c_2 t + \frac{4t^{9/2}}{63}\right)e^{-2t}.\]

(you need to use the variation of the parameter to get the particular solution)
5. (4 points) (from ch. 2.5, ex 8) Solve the equation

\[ y'' - 6y' + 9y = (3t^7 - 5t^4)e^{3t}. \]

**Solution:**

\[ y = \left( c_1 + c_2t + \frac{t^9}{24} - \frac{t^6}{6} \right) e^{3t}. \]

(the judicious guessing can give you the particular solution)