Problem 1. Solve the IVP $\frac{dx}{dt} = -x + 5$, $x(0) = x_0$. 
Chapter 1

Problem 2. Solve the IVP $\frac{dx}{dt} = -2x + 10$, $x(0) = x_0$. 
Chapter 1

Problem 3. Determine the values of $r$ for which the given differential equation has solutions of the form $x = e^{rt}$. The equation is:

$$x' + 2x = 0$$
Chapter 1

Problem 4. Do the same question as above, except with the equation:

\[ x''' - 3x'' + 2x' = 0. \]
Section 2.1

Problem 5. Find the general solution to $x' + 3x = t + e^{-2t}$. 
Section 2.1

Problem 6. Find the general solution to $x' + x = te^{-t} + 1$. 
Section 2.1

Problem 7. Solve the IVP $x' + \frac{2}{t}x = \frac{\cos t}{t^2}, x(\pi) = 0, t > 0.$
Section 2.1

Problem 8. Solve the IVP \( tx' + (t + 1)x = t, \ x(ln 2) = 1, \ t > 0. \)
Section 2.1

Problem 9. Describe the behavior of the solution corresponding to the initial value $a_0$ for the IVP $x' - \frac{1}{2}x = 2 \cos t$, $x(0) = a_0$. 