1. Textbook, Review Problem #4, p. 195. Assume \( x(t) = 0 \), for \( t < 0 \). In part (a), do not compute the impulse response function.

2. Textbook, Chapter 1, #1.2. Always assume \( x(t) = 0 \), for \( t < 0 \).

3. Consider the differential equation:

\[
(t + 2) \frac{dy(t)}{dt} + y(t) = x(t), \quad t > 0; y(0) = 0.
\]

(a) solve for \( y(t) \) in terms of \( x(t) \);

(b) Is the system described by this input-output relationship linear? Is it causal? Explain your answers.

4. Consider the differential equation:

\[
\frac{dy(t)}{dt} + 2y(t) = \frac{dx(t)}{dt} - x(t), \quad t \geq 0; y(0) = 0.
\]

(a) Solve for \( y(t) \) in terms of \( x(t) \).

(b) Find \( y(t) \) given that \( y(0) = 1 \) and \( x(t) = t, \ t \geq 0, \ x(t) = 0, \ t < 0 \).

5. Consider the following input-output relationship:

\[
y(t) = \int_{-\infty}^{\infty} e^{-\sigma} x(t - \sigma) d\sigma, \quad -\infty < t < \infty.
\]

(a) Is the system time-invariant?

(b) Find the output \( y(t) \) when the input to the system is \( x(t) = |t|, \ -\infty < t < \infty \).


7. Textbook, Chapter 2, #2.2.