1. A discrete time signal $x(n)$ is given by
\[
\begin{align*}
x(n) &= 1 & -1 \leq n \leq 2 \\
     &= 0.5 & 3 \leq n \leq 4 \\
     &= 0 & \text{elsewhere}
\end{align*}
\]

(a) Sketch and label the signal $x(n)$
(b) Hence sketch and label
   (i) $x(n - 2)$; (ii) $x(4 - n)$; (iii) $x(n + 2)$;
   (iv) $x(n) \ u(2 - n)$; (v) $x(n - 1) \ \delta(n - 3)$;
   (vi) $x(n^2)$; (vii) even part of $x(n)$; (viii) odd part of $x(n)$.

2. Show that any signal can be decomposed into an even and odd component. Is
   the decomposition unique? Illustrate your argument using the signal
   $x(n) = \{2, 3, 4, 5, 6\}$ where $x(n) = 4$ at $n = 0$.

3. 

4. Determine and sketch the convolution $y(n)$ of the signals
\[
\begin{align*}
x(n) &= 0.33n & 0 \leq n \leq 6 \\
     &= 0 & \text{elsewhere} \\
h(n) &= 1 & -2 \leq n \leq 2 \\
     &= 0 & \text{elsewhere}
\end{align*}
\]
5. Determine the direct form II realization for each of the following LTI systems.
   (i) $2y(n) + y(n - 1) - 4y(n - 3) = x(n) + 3x(n - 5)$
   (ii) $y(n) = x(n) - x(n - 1) + 2x(n - 2) - 3x(n - 4)$

6. Consider the discrete-time system shown in figure 2.2
   (i) Compute the first ten samples of its impulse response.
   (ii) Find the input-output relation
   (iii) Apply the input $x(n) = [1, 1, 1, \ldots]$ and compute the first ten samples of the output.
   (iv) Is the system causal? Is the system stable?

7. For the circuit of Figure 2.3
   (i) Determine and sketch the impulse response for the following system for $n = 0, 1, \ldots 9$.
   (ii) Classify the system as FIR or IIR