1. Given the relationships between the impulse, unit rectangle, and unit step functions in (a), (b), and (c) below, substitute (b) → (c), and the resulting (c) → (a) for an arbitrary value of k (do not take the limit). Evaluate the integral in the resulting equation for (a) and compare the right and left hand sides of the equation graphically. Show they are equal as the limit is now evaluated.

a. \( u(t) = \int_{-\infty}^{t} \delta(\lambda) d\lambda \)

b. \( \text{rect}(t) = u(t + 1/2) - u(t - 1/2) \)

c. \( \delta(t) = \lim_{k \to \infty} k \cdot \text{rect}(kt) \)

2. The signal for the binary sequence \( [b_1=1, b_2=1, 0, 1, 0, 0, 1, b_8=1] \) is shown below (using +2 for logic high and -2 for logic low values).

   a. Give an expression for the signal in terms of the logical bit values \( b_1 \) through \( b_8 \).
   
   b. Calculate the average value, average power, and total energy (in the range \( 0 < t < 8T \) for all three calculations).
   
   c. Is the signal an energy or power signal?
   
   d. Find the even and odd components of the signal.
   
   e. Redo parts (a-b) by replacing logic high with a high to low trans and logic low with a low to high transition.

3. The signal above in (2a) has discontinuities at the symbol transitions. Find an express for the signal below that provides some linear smoothing between symbol.
4. For the finite energy signal below.

a. Plot the integral and derivative of the signal.
b. Plot the power.
c. Calculate the Energy.
d. Plot the even and odd components.