Problem 4.1: Use the sifting property of the impulse to evaluate each of the following expressions.

(a) $\sum_{n=-1}^{\infty} \left(\frac{1}{4}\right)^n \delta[n]$

(b) $\sum_{n=-3}^{\infty} \left(\frac{1}{4}\right)^n \delta[n]$

(c) $\sum_{n=1}^{\infty} \left(\frac{1}{4}\right)^n \delta[n]$

(d) $\sum_{n=-1}^{\infty} \left(\frac{1}{4}\right)^n \delta[n-2]$

Problem 4.2: Use the sifting property of the impulse to evaluate each of the following expressions.

(a) $\int_{-\infty}^{\infty} \delta(t)dt$

(b) $\int_{0}^{\infty} e^{-t}\delta(t-2)dt$

(c) $\int_{-2}^{\infty} e^{-t}\delta(t-2)dt$

(d) $\int_{-\infty}^{0} (t^2+t+1)\delta(t-2)dt$

Problem 4.3: With a straightedge, make a sketch of each of the following signals. Label each axis and all important features. Show the origin for context.

(a) $x[n] = \delta[n+2] - \delta[n-2]$

(b) $y(t) = 2\delta(t) + \delta(t-1)$

(c) $h[n] = \sum_{k=-\infty}^{\infty} \delta[n-2k]$

Problem 4.4: Express the following signals in terms of the unit step:

(a) $g[n] = \begin{cases} -1, & n \geq 1 \\ 0, & \text{else} \end{cases}$

(b) The signal $w(t)$ Figure 1

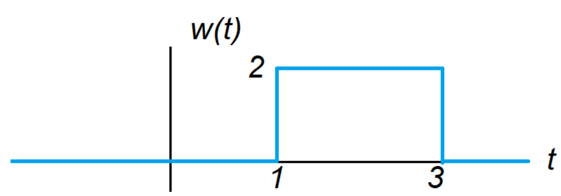

Figure 1

Optional, but testable, problems: From the textbook, Problems 1.13, 1.22 (e,f)