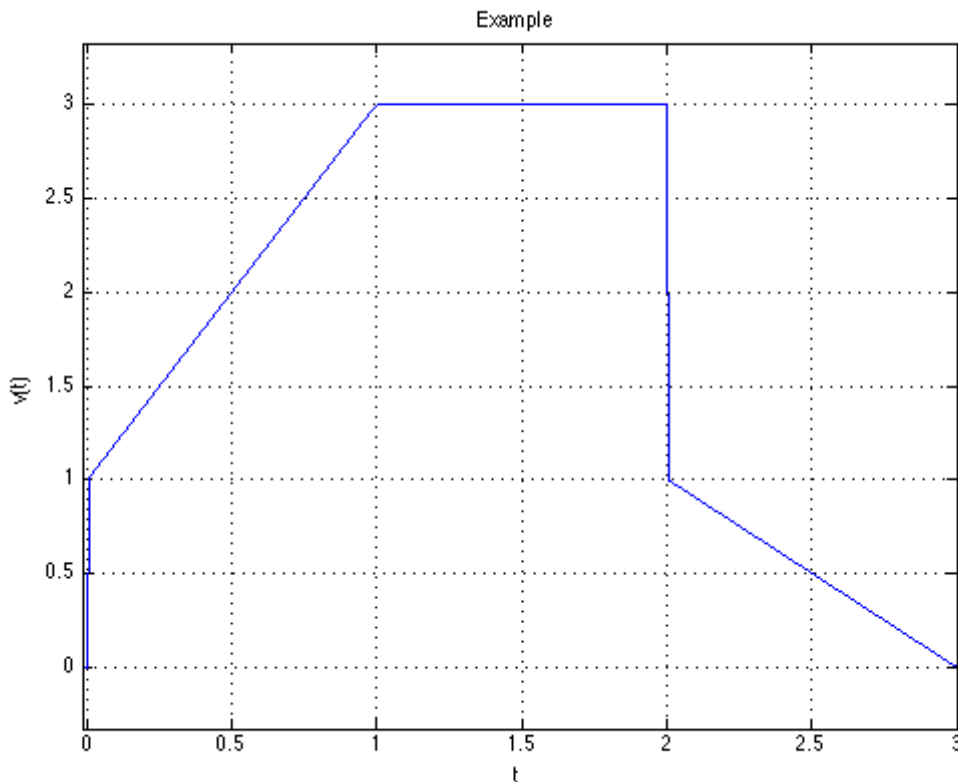# Homework 1

Elementary signals

Copy this page into the *Homework* section of your personal section of the **OneNote Class Notebook** then you can use the *ink feature* (if supported) to hand-write or sketch your answers.

1. Show that the waveform shown below

can be represented by the function
$$v(t) = (2t + 1)u_0(t) - 2(t - 1)u_0(t - 1) - tu_0(t - 2) + (t - 3)u_o(t - 3).$$

2. Evaluate each of the following functions:
    A. $\sin t\, \delta(t - \frac{\pi}{6})$
    B. $\cos 2t\, \delta(t - \frac{\pi}{4})$
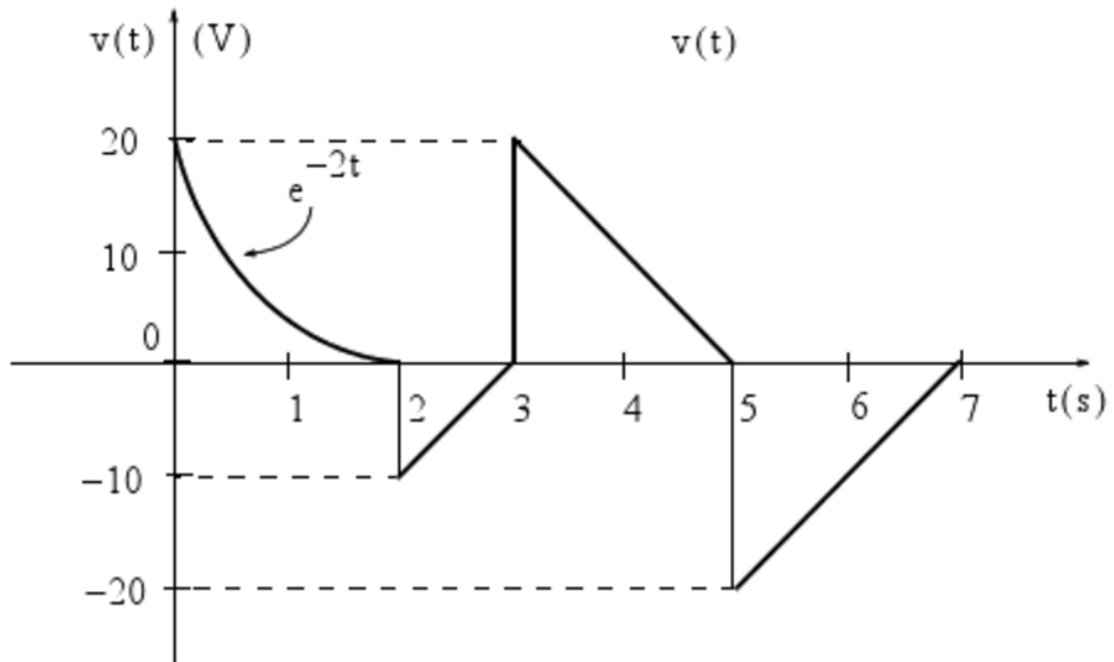   C. $\cos^2 t\, \delta(t - \frac{\pi}{2})$
    D. $\tan 2t\, \delta(t - \frac{\pi}{8})$
    E. $\int_{-\infty}^{+\infty} t^2\, e^{-t}\, \delta(t - 2)\, dt$
    F. $\sin^2 t\, \delta'(t - \frac{\pi}{2})$

   Check your answers with Matlab.

3.   A. Express the voltage waveform $v(t)$ shown below as a sum of unit step funtions for the time interval $0 < t < 7$ s.

B. Using the result of part A) compute the time derivative of $v(t)$, and sketch its waveform.