

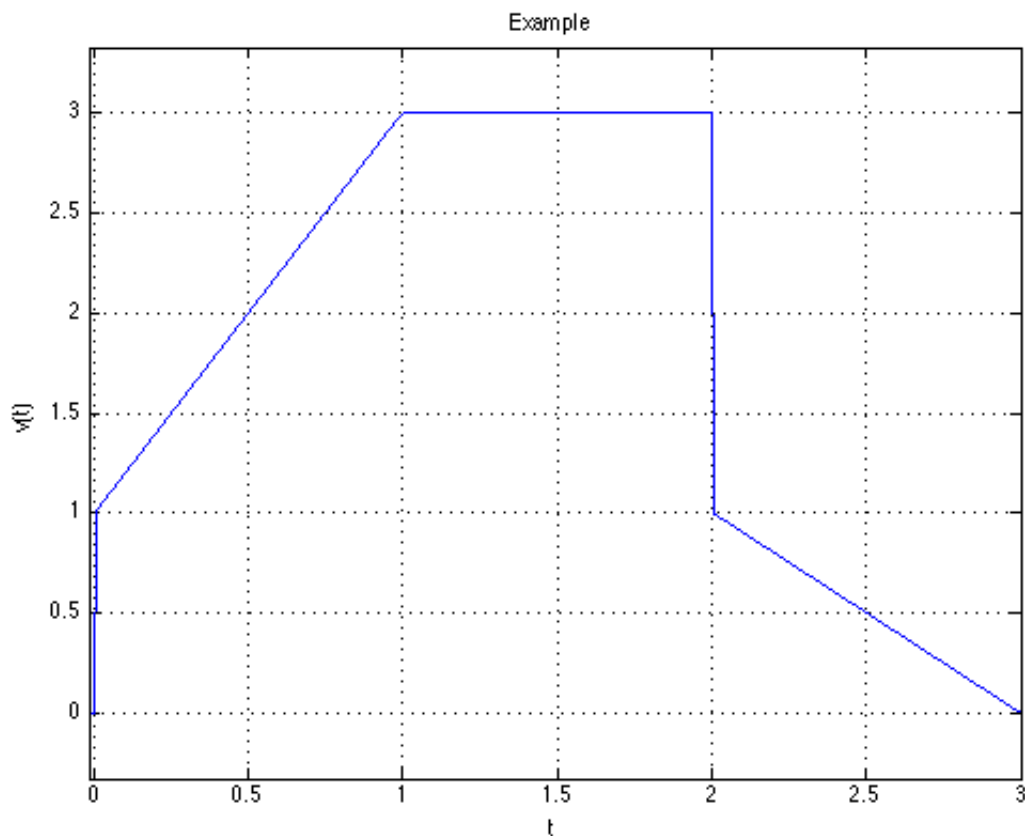
Homework 1 Elementary Signals

Homework 1

Elementary signals

We will distribute this PDF to 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

$$v(t) = (2t + 1)u_0(t) - 2(t - 1)u_0(t - 1) - tu_0(t - 2) + (t - 3)u_0(t - 3).$$

2. Evaluate each of the following functions:

1. $\sin t \delta(t - \frac{\pi}{6}) \sin t \delta(t - \frac{\pi}{6})$

2. $\cos 2t \delta(t - \frac{\pi}{4}) \cos 2t \delta(t - \frac{\pi}{4})$

3. $\cos^2 t \delta(t - \frac{\pi}{2}) \cos^2 t \delta(t - \frac{\pi}{2})$

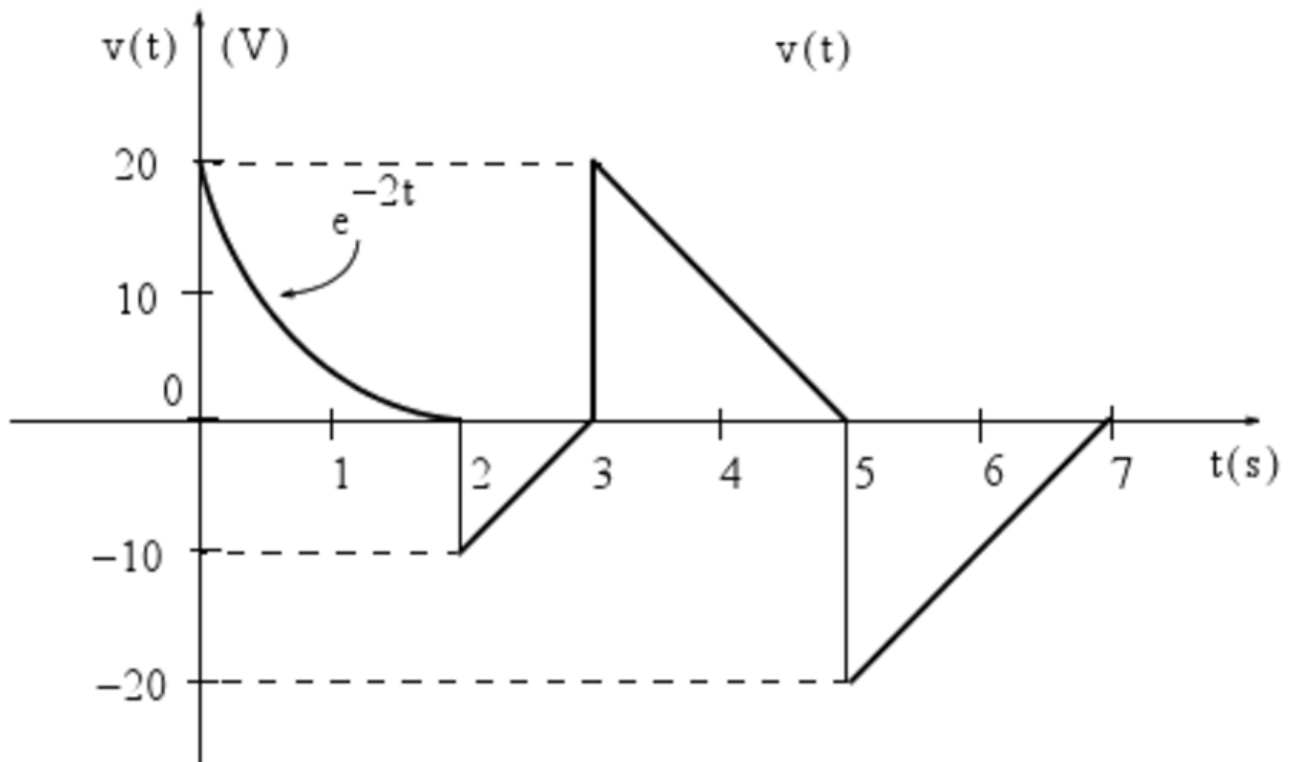
4. $\tan 2t \delta(t - \frac{\pi}{8}) \tan 2t \delta(t - \frac{\pi}{8})$

5. $\int_{-\infty}^{+\infty} t^2 e^{-t} \delta(t - 2) dt \int_{-\infty}^{+\infty} t^2 e^{-t} \delta(t - 2) dt$

6. $\sin^2 t \delta'(t - \frac{\pi}{2}) \sin^2 t \delta'(t - \frac{\pi}{2})$

Check your answers with Matlab.

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



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