Homework 1

Elementary signals

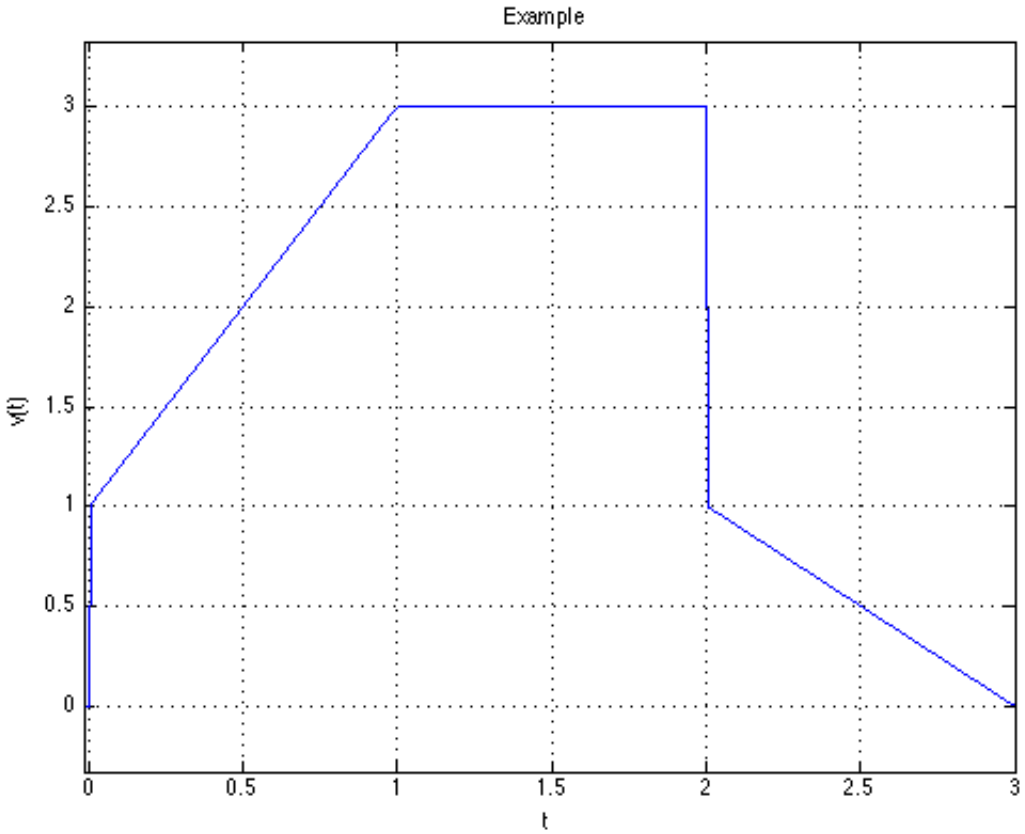
We will distribute this PDF to the *Homework* section of your personal section of the **OneNote Class Notebook** then you can use the *ink feature* (if supported) to hand-write or sketch your answers.

1. Show that the waveform shown below can be represented by the function

   \begin{equation}

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

   \end{equation}

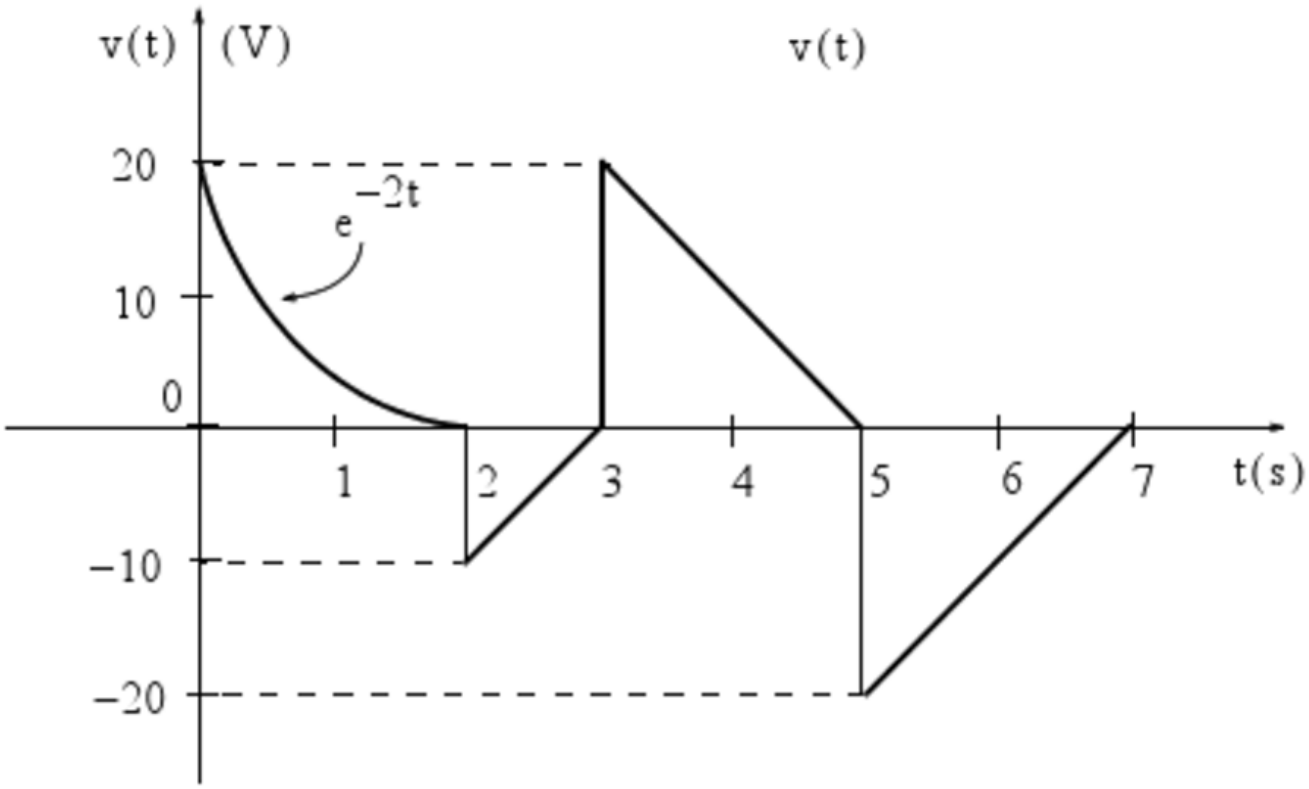


1. Evaluate each of the following functions:
   A. $\sin t\ \delta(t - \frac{\pi}{6})$;
   B. $\cos 2t\ \delta(t - \frac{\pi}{4})$;
   C. $\cos^2 t\ \delta(t - \frac{\pi}{2})$;
   D. $\tan 2t\ \delta(t - \frac{\pi}{8})$;
   E. $\int_{-\infty}^{+\infty} t^2\ e^{-t}\ \delta(t - 2)\ dt$;

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

Check your answers with Matlab.

2. Consider the waveform shown in {numref} `fig2`
   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. Use this result to compute the time derivative of $v(t)$, and sketch its waveform.



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