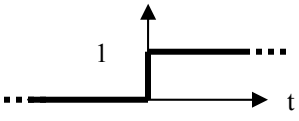
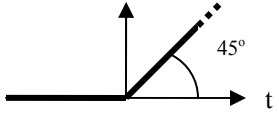
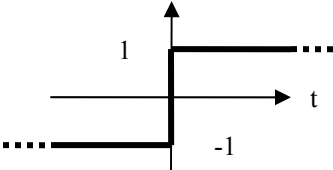
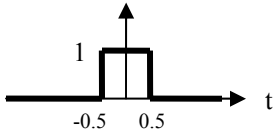
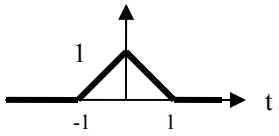
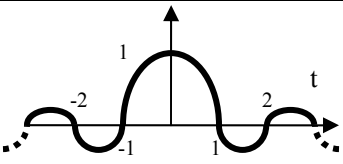
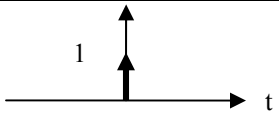


EE228 – Common Signals – Dr. Fred DePiero

Unit Step	$u(t) = \begin{cases} 0, & t < 0 \\ 1, & t > 0 \end{cases}$, undefined for $t = 0$.	
Unit Ramp	$r(t) = \begin{cases} 0, & t < 0 \\ t, & t \geq 0 \end{cases}$	
Signum (sign of argument)	$\text{sgn}(t) = \begin{cases} +1, & t < 0 \\ 0, & t = 0 \\ -1, & t > 0 \end{cases}$	
Rectangle or pulse	$\text{rect}(t) = \begin{cases} 1, & t < 0.5 \\ 0, & \text{else} \end{cases}$, width = 1	
Triangle	$\text{tri}(t) = \begin{cases} 1- t , & t < 1 \\ 0, & \text{else} \end{cases}$, width = 2	
Sinc	$\text{sinc}(t) = \sin(\pi t) / \pi t$	
Impulse	$\delta(t) = \begin{cases} 0, & t \neq 0 \\ \infty, & t = 0 \end{cases}$	

Additional Notes & Properties

- The ‘Heavyside’ version of the unit step is defined as having value 0.5 at $t=0$.
- $r(t) = t u(t)$. $u(t)$ is the derivative of $r(t)$ and $r(t)$ is the running integral of $u(t)$
- $\delta'(t)$ is the derivative of $u(t)$. The doublet $\delta''(t)$ is the derivative of $\delta'(t)$. $u(t)$ is the running integral of $\delta(t)$.

Properties of Impulses

- An impulse has infinite amplitude, zero duration and finite area. Integrating across an impulse yields an area, or ‘strength’ $\int \delta(t) dt = 1$
- A ‘weighted impulse’ $K \delta(t)$ has area = K and is drawn as an upward arrow with height K .
- Scaling Property: $\delta(\alpha t) = \frac{1}{|\alpha|} \delta(t)$
- Product Property: $x(t)\delta(t - \beta) = x(\beta)\delta(t - \beta)$
- Sifting Property: $\int x(t)\delta(t - \gamma) dt = x(\gamma)$