Calculus Review for Circuits II

- **Why?**

Circuits I:

$$v(t) = R \cdot i(t)$$
$$i(t) = \frac{1}{R} v(t)$$

Circuits II:

$$v(t) = \frac{1}{C} \int_{-\infty}^{t} i(t)\, dt$$
$$i(t) = C v'(t)$$

Derivatives

- **Notation**

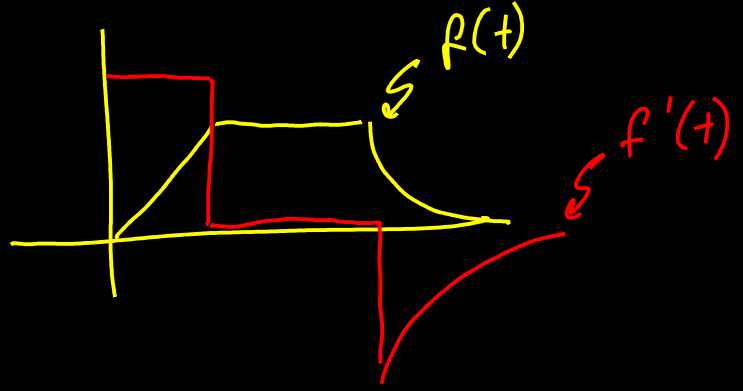
$v(t) = 3e^{-2t}\ V$

$v'(t) = -6e^{-2t}\ V/s$

$\frac{d}{dt}v(t) = -6e^{-2t}\ V/s$

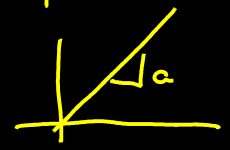
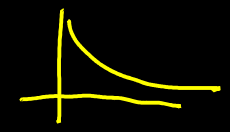
$\frac{dv}{dt} = -6e^{-2t}\ V/s$

- **Intuition**



Derivatives

- **Common ones**

$f(t)$	$f'(t)$
C 	0
at 	a
e^{-at} 	$-ae^{-at}$
$\cos(\omega t+\theta)$ 	$-\omega \sin(\omega t+\theta)$
$\sin(\omega t+\theta)$ 	$\omega \cos(\omega t+\theta)$

- **Properties**

$C \cdot f(t)$ $2e^{-3t}$	$C \cdot f'(t)$ $2\cdot(-3)e^{-3t}$
$f(t)+g(t)$	$f'(t)+g'(t)$
$f(t)\cdot g(t)$	$f'(t)\cdot g(t)+f(t)\cdot g'(t)$