TABLA DE DERIVADAS E INTEGRALES

$$h(t) = \frac{df(t)}{dt} = \lim_{\Delta t \to 0} \frac{f(t+\Delta t) - f(t)}{\Delta t} \qquad \Leftrightarrow \qquad \int^t h(\tau) d\tau = f(t)$$

Derivadas:

$$x(t) = cf(t) \qquad \rightarrow \qquad \frac{dx(t)}{dt} = c\frac{df(t)}{dt}$$

$$x(t) = f(t) + g(t) \qquad \rightarrow \qquad \frac{dx(t)}{dt} = \frac{df(t)}{dt} + \frac{dg(t)}{dt}$$

$$x(t) = f(t)g(t) \qquad \rightarrow \qquad \frac{dx(t)}{dt} = g(t)\frac{df(t)}{dt} + f(t)\frac{dg(t)}{dt}$$

$$x(t) = f[g(t)] \qquad \rightarrow \qquad \frac{dx(t)}{dt} = \left.\frac{df(\tau)}{d\tau}\right|_{\tau=g(t)} \frac{dg(t)}{dt}$$

$$x(t) = \frac{f(t)}{g(t)} \qquad \rightarrow \qquad \frac{dx(t)}{dt} = \frac{df(t)}{dt}\frac{1}{g(t)} - \frac{f(t)}{g(t)^2}\frac{dg(t)}{dt}$$

Integrales:

$$v(t) = cf(t) \qquad \rightarrow \qquad \int^t v(\tau) d\tau = c\int^t f(\tau)$$

$$v(t) = f(t) + g(t) \qquad \rightarrow \qquad \int^t v(\tau) d\tau = \int^t f(\tau) d\tau + \int^t g(\tau) d\tau$$

Casos específicos

$$h(t) = \int^t [0]\, d\tau = c \qquad \Leftrightarrow \qquad \frac{dh(t)}{dt} = 0$$

$$h(t) = \int^t [1]\, d\tau = t \qquad \Leftrightarrow \qquad \frac{dh(t)}{dt} = 1$$

$$h(t) = \int^t [\tau]\, d\tau = \frac{1}{2}t^2 \qquad \Leftrightarrow \qquad \frac{dh(t)}{dt} = t$$

$$h(t) = \int^t [\tau^2]\, d\tau = \frac{1}{3}t^3 \qquad \Leftrightarrow \qquad \frac{dh(t)}{dt} = t^2$$

$$h(t) = \int^t [\tau^n]\, d\tau = \frac{1}{n+1}t^{n+1} \qquad \Leftrightarrow \qquad \frac{dh(t)}{dt} = t^n$$

excepto para $n = 1$ porque

$$h(t) = \int^t \left[\frac{1}{\tau}\right] d\tau = \ln(t) \qquad \Leftrightarrow \qquad \frac{dh(t)}{dt} = \frac{1}{t}$$

Funciones especiales

$$h(t) = \int^t [\sin(\tau)]\, d\tau = -\cos(t) \qquad \Leftrightarrow \qquad \tfrac{dh(t)}{dt} = sin(t)$$

$$h(t) = \int^t [\cos(\tau)]\, d\tau = \sin(t) \qquad \Leftrightarrow \qquad \tfrac{dh(t)}{dt} = cos(t)$$

$$h(t) = \int^t [e^{a_o \tau}]\, d\tau = \tfrac{1}{a_o} e^{a_o \tau} \qquad \Leftrightarrow \qquad \tfrac{dh(t)}{dt} = e^{a_o \tau}$$