

## Properties of Laplace Transforms

**f(t)**

**F(s)**

$f(t)$

$$F(s) = \int_0^{\infty} f(t)e^{-st} dt$$

$f(at)$

$$(1/a)F(s/a)$$

$f(t-a)$

$$e^{-sa}F(s)$$

$f(t)e^{-at}$

$$F(s+a)$$

$(-t)^n f(t)$

$$F^{(n)}(s)$$

$f'(t)$

$$sF(s) - f(0)$$

$f^{(n)}(t)$

$$s^n F(s) - s^{n-1}f(0) - s^{n-2}f'(0) - \dots -$$

$\int f(\tau)d\tau$

$$F(s)/s$$

$\int f_1(\tau)f_2(t-\tau)d\tau$

$$F_1(s)F_2(s)$$

$e^{-at}u(t)$

$$\frac{1}{s+a}$$

$\cos \omega t u(t)$

$$\frac{s}{s^2 + \omega^2}$$

$\sin \omega t u(t)$

$$\frac{\omega}{s^2 + \omega^2}$$

$\delta(t)$

$$1$$