Systems

Tristan Slater

September 26, 2022

1 Properties

1.1 Linearity

$$f(ax + by) = af(x) + bf(y) \tag{1}$$

1.2 Time-Invariance

System is not directly dependent on time:

$$y(t) = F(x(t), t) = F(x(t)) \tag{2}$$

This also means that any shift to time in input translates to the same shift in the output.

$$x(t + \delta) \xrightarrow{F} y(t + \delta) \tag{3}$$

2 Convolution

$$(f * g)(t) = \int_{-\infty}^{\infty} f(\tau)g(t - \tau) \ d\tau \tag{4}$$

Properties:

- Commutative