Forstærkerteknik og fejlberegning

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1 Linear Time Invariant Systems

Linear Map
The map $f : R^n -> R^m$ is said to be linear if for any $x, y \epsilon R^n$ and $\alpha \epsilon R$, the following conditions hold

$$f(x+y) = f(x) + f(y) \qquad \text{Super position}$$
$$f(ax) = \alpha f(x) \qquad \text{Homogeneity}$$

The function has to go through (0,0) in 2D for it to be linear due to homogeneity.

Time-Invariant System
Let σ : R x $R^m -> R^p$ define the input-output behavior of a system model . The system is time-invariant if for any input signal $u : R -> R^m$ and any delay $\tau \epsilon R$ the following relation holds:

$$y(t-\tau) = \sigma(t, u(t-\tau))$$

for all times $t \epsilon R$, where y denotes the output signal of the system.

The importance is that the system does not change its behavior due to time. This can be seen as a canon firing at 8am it will not fire different compared to if you do the same at 5pm.

1.1 Examples