Convolution

$(f * g)(t) = \int\limits_{-\infty}^{\infty} f(\tau)g(t-\tau)d\tau$, additionally for $f, g : [0, \infty) \to \mathbb{R}$ borders are from 0 to t.

Laplace Transform

$F(s) = \mathcal{L}(f(t)) = \int\limits_{0}^{\infty} f(t)e^{-st}dt$ is the Laplace transform of $f(t)$.

0.1 Rules

- $\mathcal{L}(y(t)) = Y(s)$
- $\mathcal{L}(y'(t)) = s \cdot Y(s)$
- $\mathcal{L}(y''(t)) = s^2 \cdot Y(s)$

Misc

$y(t)$ is output, $u(t)$ is input. Transfer function: $G(s) = \frac{Y(s)}{U(s)}$

TODO: Table 1.1

Response to an input:

1. Given: $ay'(t) + by(t) = cu(t)$
2. Laplace: $a \cdot s \cdot Y(s) + bY(s) = cU(s)$
3. Transfer function: $G(s) = \frac{Y(s)}{U(s)} = \frac{c}{a \cdot s + b}$
4. Transfer given input: $\mathcal{L}(u(t)) = U(s)$
5. Get output: $Y(s) = G(s) \cdot U(s)$
6. Transfer back output, hint partial fractions!