

Formelsamling

Grunnleggende sammenhenger:

$$\begin{aligned}\sin(\alpha \pm \beta) &= \sin \alpha \cos \beta \pm \cos \alpha \sin \beta \\ \cos(\alpha \pm \beta) &= \cos \alpha \cos \beta \mp \sin \alpha \sin \beta \\ \sin 2\alpha &= 2 \sin \alpha \cos \alpha \\ \cos 2\alpha &= 2 \cos^2 \alpha - \sin^2 \alpha \\ \sin \alpha + \sin \beta &= 2 \sin \frac{\alpha + \beta}{2} \cos \frac{\alpha - \beta}{2} \\ \sin \alpha - \sin \beta &= 2 \sin \frac{\alpha + \beta}{2} \sin \frac{\alpha - \beta}{2} \\ \cos \alpha + \cos \beta &= 2 \cos \frac{\alpha + \beta}{2} \cos \frac{\alpha - \beta}{2} \\ \cos \alpha - \cos \beta &= -2 \sin \frac{\alpha + \beta}{2} \sin \frac{\alpha - \beta}{2} \\ \cos^2 \alpha + \sin^2 \alpha &= 1 \\ \cos \alpha &= \frac{1}{2}(e^{j\alpha} + e^{-j\alpha}) \\ \sin \alpha &= \frac{1}{2j}(e^{j\alpha} - e^{-j\alpha}) \\ \sum_{n=0}^{N-1} a^n &= \begin{cases} N & \text{for } a = 1 \\ \frac{1-a^N}{1-a} & \text{otherwise} \end{cases} \\ ax^2 + bx + c = 0 &\Leftrightarrow x_{\pm} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\end{aligned}$$

Konvolusjon:

$$y[n] = x[n] * h[n] = \sum_{k=-\infty}^{\infty} x[k]h[n-k] = \sum_{k=-\infty}^{\infty} x[n-k]h[k] = h[n] * x[n]$$

Diskret tids Fourier transform (DTFT):

$$\begin{aligned}\text{Analyse: } X(\Omega) &= \sum_{n=-\infty}^{\infty} x(n)e^{-j\Omega n} \\ \text{Syntese: } x[n] &= \frac{1}{2\pi} \int_{-\pi}^{\pi} X(\Omega)e^{j\Omega n} d\Omega\end{aligned}$$

Diskret Fourier transform (DFT):

$$\begin{aligned}\text{Analyse: } X[k] &= \sum_{n=0}^{N-1} x[n]e^{-j2\pi kn/N}, \quad 0 \leq k \leq N-1 \\ \text{Syntese: } x[n] &= \frac{1}{N} \sum_{k=0}^{N-1} X[k]e^{j2\pi kn/N}, \quad 0 \leq k \leq N-1\end{aligned}$$

The z-transform:

$$\text{Analyse: } X(z) = \sum_{n=-\infty}^{\infty} x[n]z^{-n}$$