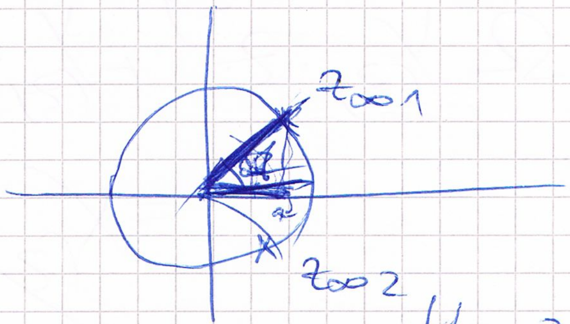


$$z_{\infty 1} = z_{\infty 2}^{*}$$

$$H(z) = \frac{1}{(z - z_{\infty 1})(z - z_{\infty 2})}$$

$$= \frac{1}{z^2 - (z_{\infty 1} + z_{\infty 2}) \cdot z + z_{\infty 1} \cdot z_{\infty 2}} \to 1$$

$$z_{\infty 1} \cdot z_{\infty 2} = z_{\infty 1} \cdot z_{\infty 1}^{*} = |z_{\infty 1}|^2$$

$$z_{\infty 1} = a + jb$$

$$z_{\infty 2} = a - jb$$

$$z_{\infty 1} + z_{\infty 2} = 2a$$

$$a = \cos \Omega$$

$$H(z) = \frac{1}{z^2 - 2\cos\Omega \, z + 1}$$

$$\Omega = 2\pi \frac{f_0}{f_S}$$

$$x \longrightarrow \boxed{H(z)} \longrightarrow y$$

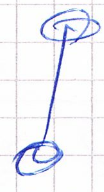
$$H(z) = \frac{Y(z)}{X(z)}$$

$$\frac{Y(z)}{X(z)} = \frac{1}{z^2 - 2\cos\Omega \, z + 1} \quad \Big/ \cdot z^{-2}$$

$$\frac{Y(z)}{X(z)} = \frac{1}{1 - 2\cos\Omega \, z^{-1} + z^{-2}}$$

$$Y_{(z)} \cdot \cancel{1} = 2\cos\Omega\, Y_{(z)} \cdot z^{-1} - Y_{(z)} \cdot z^{-2}$$

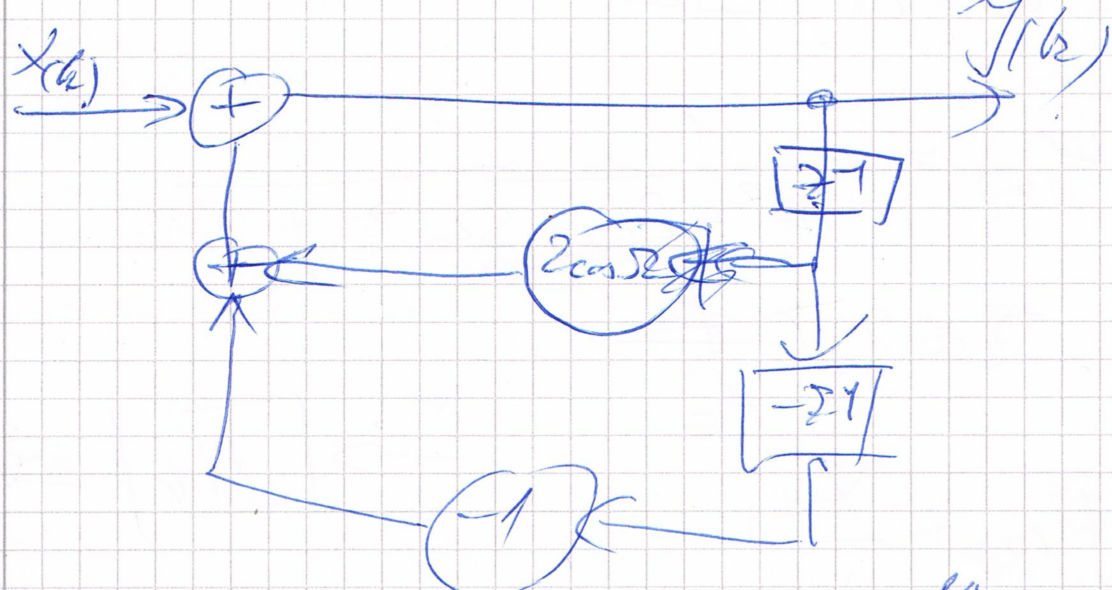
$$= X_{(z)}$$

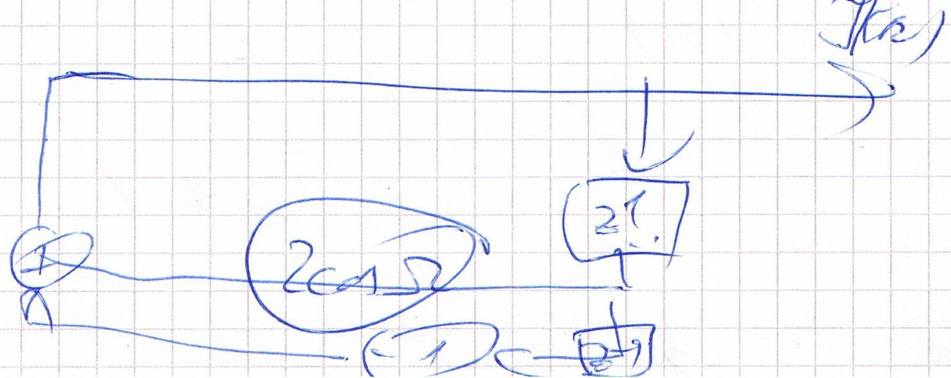


$$y_{(k)} - 2\cos\Omega\, y_{(k-1)} + y_{(k-2)} = x_{(k)}$$

$$y_{(k)} = x_{(k)} + 2\cos\Omega\, y_{(k-1)} - y_{(k-2)}$$

0 0 0 1 0 0 0 0 – –





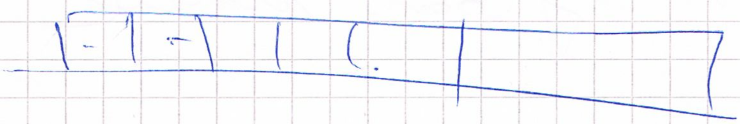
for

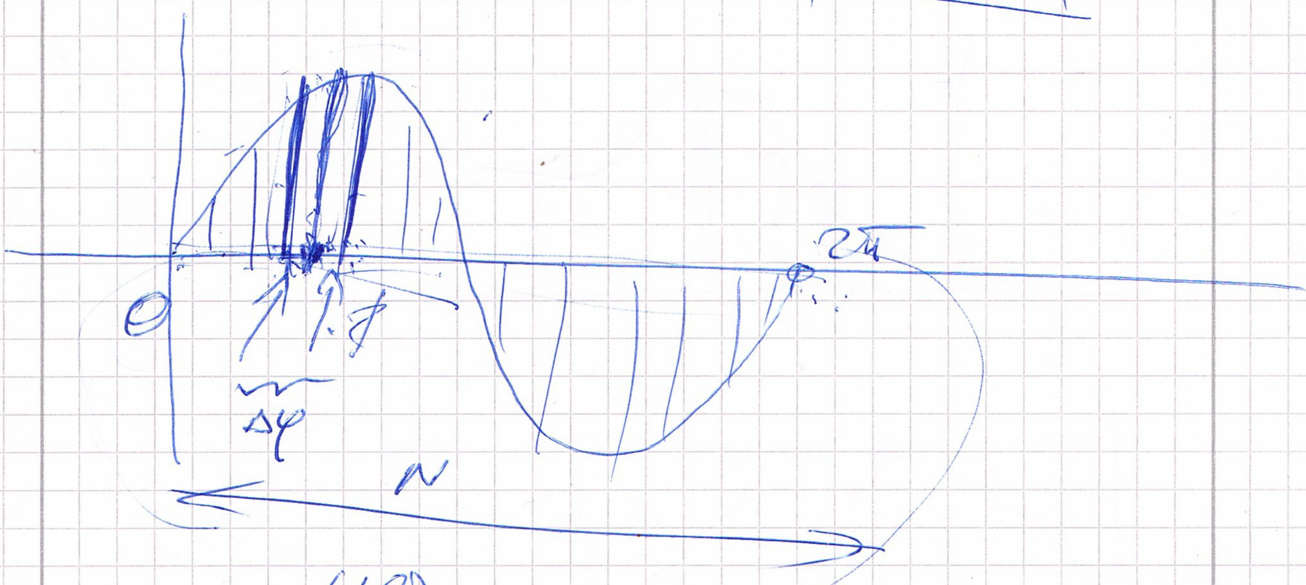
current value = $2\cos\Omega$ · past value
− pastpastvalue

pastpastvalue = past value
past value = current value

}

DDS





$\cos(\varphi)$

$$\varphi = 2\pi f \cdot t = 2\pi f \cdot k \cdot T_S = \frac{2\pi f}{f_S} \cdot k$$

$$\varphi_k = \frac{2\pi f}{f_S} \cdot k$$

$$\varphi_{k-1} = \frac{2\pi f}{f_S}(k-1)$$

$$\Delta\varphi = \varphi_k - \varphi_{k-1} = \frac{2\pi f}{f_S}$$

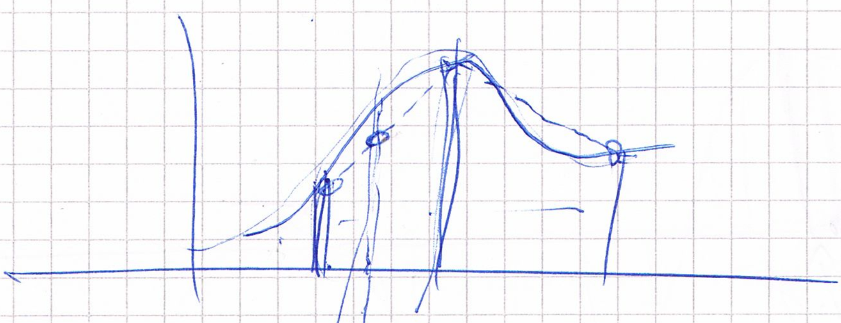
N

N — 2π

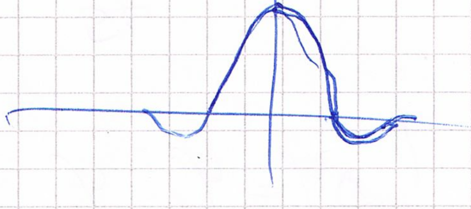
Δn — $\Delta\varphi$

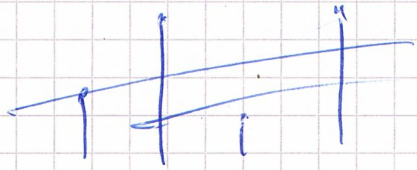
$$\Delta n = \frac{N \cdot \Delta\varphi}{2\pi} = N \cdot \frac{f}{f_s}$$

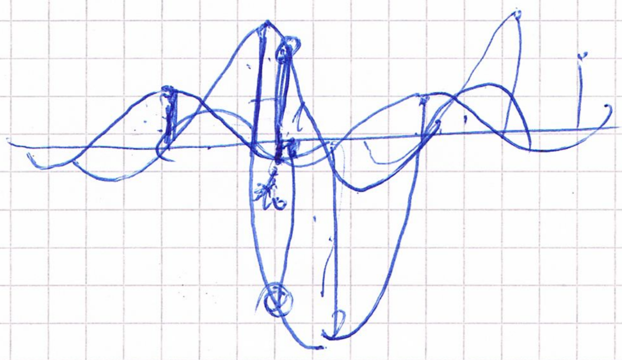
$\Delta n \rightarrow$ float value



$\frac{\sin x}{x}$







Lanczos : $f(t)$

$$x(t_0) = x(\underbrace{\lfloor t_0 \rfloor}_{2}) \cdot f(\underbrace{t_0 - \lfloor t_0 \rfloor}_{0,34}) +$$

$t_0 = 2,34$

$\lfloor t_0 \rfloor = 2$

$$x(\lfloor t_0 \rfloor - 1)\, f(\underbrace{t_0 - \lfloor t_0 \rfloor + 1}_{1,34})$$

$$+\ x(\lfloor t_0 \rfloor + 1) \cdot f(\underbrace{t_0 - \lfloor t_0 \rfloor - 1}_{-0,66})$$

$$+\ x(\lfloor t_0 \rfloor + 2) \cdot f(\underbrace{t_0 - \lfloor t_0 \rfloor - 2}_{-1,66})$$