A 1.4

$$x[n] = e^{j\frac{2\pi}{N}\cdot n\cdot k} \quad ; \quad k, N \in \mathbb{Z}$$

$$x[n+N_x] = x[n] \quad ; \quad N_x \in \mathbb{Z}\ (\mathbb{N})$$

$$e^{j\frac{2\pi}{N}k(n+N_x)} = e^{j\frac{2\pi}{N}kn}\, e^{j\frac{2\pi}{N}kN_x} = e^{j\frac{2\pi}{N}kn}$$

$$e^{j\frac{2\pi}{N}kN_x} = 1$$

$$\left(\frac{N}{k}\right)^{-1} N_x = \ell \quad ; \quad \ell \in \mathbb{Z}$$

$$\left(\frac{N}{k}\right)^{-1} = \left(\frac{N_x}{\ell}\right)^{-1}$$

$$N_x = \frac{N}{k}\cdot\ell = \frac{a}{b}\cdot\ell \overset{\downarrow}{=} \frac{a}{b}\cdot b = a$$ Grundperiode so klein wie möglich!

$$a = N_x = \frac{N}{ggT(N,k)} = \frac{kgV(N,k)}{k}$$ N, k i.a. nicht teilerfremd

A 1.5

Periode : N_x , $x[n+N_x] = x[n]$

Streckungsfaktor : M , $y[n] = x[Mn]$

neue Signalperiode $N_y = \dfrac{N_x}{ggT(N_x,M)} = \dfrac{kgV(N_x,M)}{M}$