II. LABORATORIJSKA VJEŽBA

PRIPREMA

3.1-2. a)

$$w(n) = \begin{cases} 1 & 0 \le n < N \\ 0 & , \text{INAČE} \end{cases}$$

$$\text{DTFT}\left(w(n)\right) = ?$$

$$\sum_{n=0}^{N-1} x(n) \cdot e^{-jwn} = 1 \cdot e^{0} + 1 \cdot e^{-jw} + e^{-2jw} + \dots e^{-(N-1)\cdot jw}$$

$$= 1 + e^{-jw} + e^{-2jw} + \dots e^{-(N-1)jw}$$

$$= \sum_{n=0}^{N-1} e^{-jwn} = \frac{1 - e^{-jw(N-1-1)}}{1 - e^{-jw}} \qquad // \quad \frac{a}{1-r} = \sum_{i=0}^{\infty} a \cdot r^{i}$$

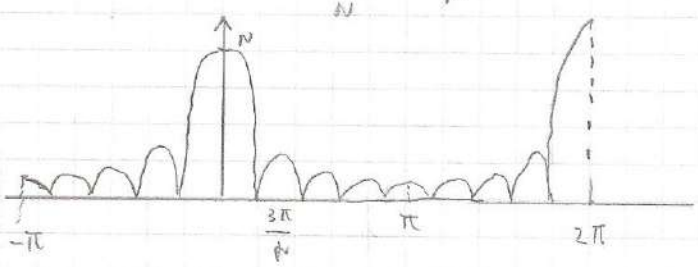
$$= \frac{1 - e^{-jwN}}{1 - e^{-jw}} = \frac{e^{-j\frac{wN}{2}}\left(e^{j\frac{wN}{2}} - e^{-j\frac{wN}{2}}\right)\frac{2j}{2j}}{e^{-j\frac{w}{2}}\left(e^{j\frac{w}{2}} - e^{-j\frac{w}{2}}\right)\frac{2j}{2j}}$$

$$= e^{-j\frac{w}{2}(N-1)} \cdot \frac{\sin\left(\frac{w}{2}N\right)}{\sin\left(\frac{w}{2}\right)}$$

$$A(w) = \frac{\sin\left(\frac{w}{2}N\right)}{\sin\left(\frac{w}{2}\right)}$$

$$\frac{A(\phi)}{A\left(\frac{3\pi}{N}\right)} = \left| \frac{N}{\frac{\sin\left(\frac{3\pi}{N}\right)}{\sin\left(\frac{3\pi}{2N}\right)}} \right| = \frac{N}{1} = N \cdot \sin\left(\frac{3\pi}{2N}\right)$$

ŠIRINA 1. LATICE $= \frac{2 \cdot 2\pi}{N} = \frac{4\pi}{N}$



3.2. - 1. a)

NEMA PREKLAPANJA SPEKTRA => NEMA GUBITKA INFORMACIJA

GUBITAK BI NASTAO KADA SPEKTRALNA DULJINA $X_1[m]$ BILA $B_1 = 44100 Hz$ JEDNA PORUKA

I $X_2[m]$ $B_2 = 10000 Hz$ uz $f_s = 176400 Hz$ DVOSTRUKA KADA BI FREKVENCIJA

BILA MANJA ILI JEDNAKA $27050 Hz$. $\left(\frac{B_1 + B_2}{2}\right)$

f' - FREKVENCIJA NOSIOCA VEĆA OD $27050 Hz$ I MANJA OD $83200 Hz$ $\left(\frac{f_s - B_2}{2}\right)$

U KOJOJ NEMA PREKLAPANJA

f'_p - FREKVENCIJA NOSIOCA MANJA OD $27050 Hz$ U KOJOJ POLAZI PO

PREKLAPANJA,