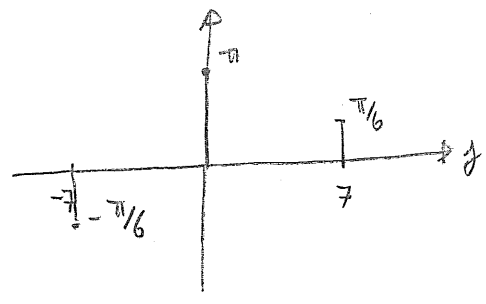
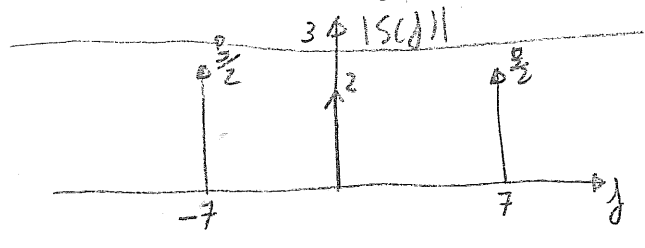


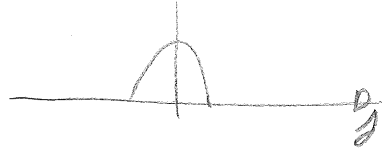
ES.21

$$x(t) = -2 + 5 \cos(14\pi t + \frac{\pi}{8}) + 3 \delta(t)$$

$$S(f) = -2 \delta(f) + \frac{5}{2} e^{j\frac{\pi}{8}} \delta(f-7) + \frac{5}{2} e^{-j\frac{\pi}{8}} \delta(f+7) + 3$$

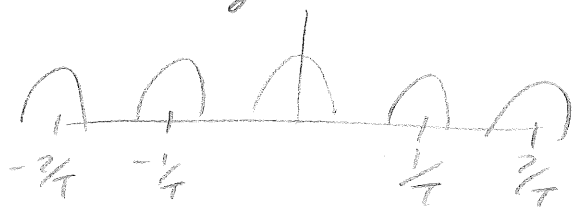


$$\bar{S}_1(f) = \frac{1}{T} \sum_{k=-\infty}^{\infty} S_1(f - \frac{k}{T})$$



ES.3

$f_{min} = 90 \text{ Hz}$
 $f_{max} = 112 \text{ Hz}$



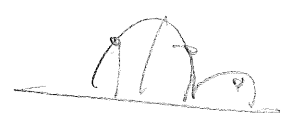
I) Passa bassa $f_c \geq 2f_{max}$ $f_c \geq 224 \text{ Hz}$
Passa banda

$B = 22 \text{ Hz}$ $\frac{f_{max}}{B} = \frac{112}{22} = 5, \# \Rightarrow m = 5$

$f_c = \frac{2f_{max}}{m} = 44,8 \text{ Hz}$

$$\bar{X}(f) = \sum_{n=-\infty}^{\infty} x(nT) e^{-j2\pi n f T}$$

$$X(k) = \frac{1}{M} \bar{X}(\frac{k}{MT})$$



II) $f_{c, max}$ Malispavi
 $\frac{N-1}{2NT}$

II) $SIN(x) = \cos(\frac{2\pi x}{60}) + 2 \sin(\frac{2\pi x}{20})$

periodo di SIN(x) $T_0 = 60$

ES.61

I) B II) D III) D IV) B

ES.71

I) B II) D III) B IV) -12 e 12