3/6/08

1)

ES.3
Parte 2

Si utilizzi la binomiale per calcolare la probabilità che un giocatore di pallacanestro, con una percentuale sul tiro da 6 metri del 60%, realizzi 4 canestri su 5 tiri, e la probabilità che realizzi almeno 3 canestri su 5 tiri

a) $P = 0,6 \quad n=5 \quad K=4$

$$P_5(4) = \frac{5!}{4!\,1!} p^4 q = 5 \cdot 0,6^4 \, 0,4 = 0,25$$

b) $P\{\text{almeno 3 canestri su 5 tiri}\} = P_5(3) + P_5(4) + P_5(5) =$

$$= \frac{5!}{3!\,2!} 0,6^3 \cdot 0,4^2 + \frac{5!}{4!\,1!} 0,6^4 \cdot 0,4 + \frac{5!}{5!\,0!} 0,6^5 0,4^0 =$$

$$= 0,6826$$

ES.5)

$$S_n = \frac{\sin\left(\frac{\pi n}{2}\right)}{n^2} + j\,\frac{\cos(\pi n)}{n} \quad , \text{per } n \neq 0 \quad S_0 = 0$$

$$S_{-n} = \frac{\sin\left(-\frac{\pi n}{2}\right)}{n^2} + j\,\frac{\cos(-\pi n)}{-n} = -\frac{\sin\frac{\pi n}{2}}{n^2} - j\,\frac{\cos \pi n}{n} = -S_n$$

segnale pari e complesso

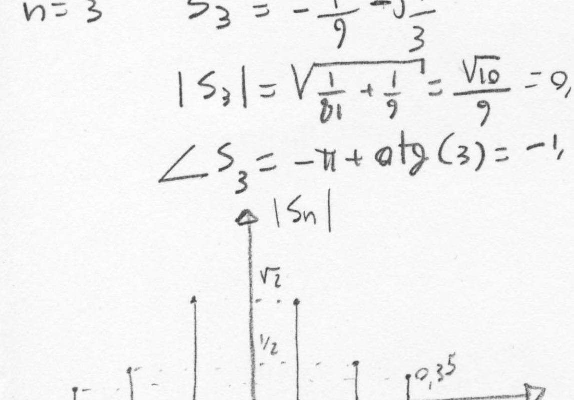
$n=1 \quad S_1 = 1 - j = \sqrt{2}\, e^{-j\frac{\pi}{4}} \qquad S_{-1} = -1 + j = \sqrt{2}\, e^{j\frac{3}{4}\pi}$

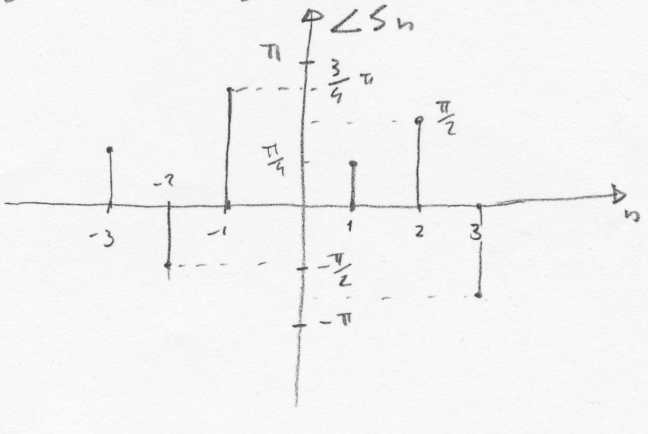
$n=2 \quad S_2 = j\frac{1}{2} = \frac{1}{2} e^{j\frac{\pi}{2}} \qquad S_{-2} = -j/2 = \frac{1}{2} e^{-j\frac{\pi}{2}}$

$n=3 \quad S_3 = -\frac{1}{9} - j\frac{1}{3} \qquad S_{-3} = \frac{1}{9} + j\frac{1}{3}$

$|S_3| = \sqrt{\frac{1}{81} + \frac{1}{9}} = \frac{\sqrt{10}}{9} = 0,3514 \qquad |S_{-3}| = 0,3514$

$\angle S_3 = -\pi + \mathrm{atg}(3) = -1,89 = -108° \qquad \angle S_{-3} = \mathrm{atg}(3) = 1,2490 \cong 71°$

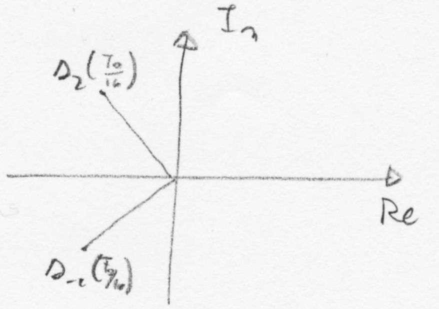




$s_2(t) = S_2 \, e^{j\frac{4\pi t}{T_0}}$ $\qquad$ $s_{-2}(t) = S_{-2} \, e^{j\frac{-4\pi t}{T_0}}$

$$s_2\left(\frac{T_0}{16}\right) = \frac{1}{2} e^{j\frac{\pi}{2}} e^{j\frac{\pi}{4}} = \frac{1}{2} e^{j\frac{3}{4}\pi}$$

$$s_{-2}\left(\frac{T_0}{16}\right) = \frac{1}{2} e^{-j\frac{\pi}{2}} e^{-j\frac{\pi}{4}} = \frac{1}{2} e^{-j\frac{3}{4}\pi}$$



ES.6

a) $S(f)\, e^{j2\pi f T/2} \Leftrightarrow s\left(t + \frac{T}{2}\right) \Rightarrow 6$

b) $j2\pi f\, S(f) \Leftrightarrow \frac{d}{dt} s(t) \Rightarrow 5$

c) $\frac{S(f - 1/T_0) + S(f + 1/T_0)}{2} \Leftrightarrow \frac{s(t)}{2} e^{-j\frac{2\pi t}{T_0}} + \frac{s(t)}{2} e^{j\frac{2\pi t}{T_0}} = s(t) \cos 2\pi \frac{t}{T_0} \Rightarrow 4$

ES.7

$f_{min} = 8\,KHz$ $\quad f_{max} = 15\,KHz$

PASSO BASSO $\quad f_c \geq 2 f_{max} = 30\,KHz$

PASSA BANDA $\quad B = f_{max} - f_{min} = 7\,KHz$ $\qquad \frac{f_{max}}{B} = \frac{15\,kHz}{7\,kHz} = 2,14 \Rightarrow m = 2$

$$f_c = \frac{2 f_{max}}{m} = f_{max}$$

$f_c = 15\,KHz$

$h[n]$, lunga $P = 100$

$df_{out} = \frac{1}{T_{out}} = \frac{1}{N_{out} \cdot dt}$ $\qquad N_{out} = N_{in} + P - 1$ $\qquad dt = \frac{1}{f_c} = 66.67\,\mu s$

$N_{in} = \frac{T}{dt} = 15K$

$$df_{out} = \frac{1}{15099 \cdot \frac{1}{15K}} = 0,9934\,Hz$$

$\boxed{\text{ES. 8.}}$

gruppo di $n=16$, $\hat{\eta}=250$ $\hat{\sigma}=35$

popolazione $\eta_0=240$ $\sigma=20$

$$z = \frac{\hat{\eta}-\eta_0}{\sigma/\sqrt{n}} = 2$$

$H_0: \hat{\eta}=\eta_0$

$H_a: \hat{\eta}\neq\eta_0$

Ipotesi alternativa bilaterale $c=\pm 1{,}96$

l'ipotesi nulla non può essere accettata