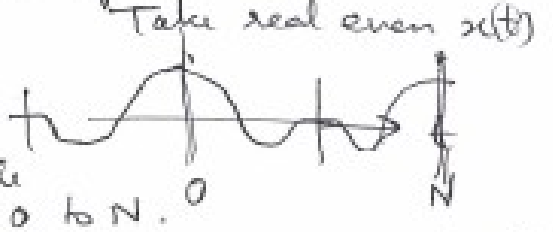
Brief Solutions of Tut 7 (for EE 210, 8th Nov 19)

Q-1: (a) sinusoid of amplitude 1.
(b) aliasing & opp rotation appears for < 2 rpm.

Q-2: we need real-even signals if DFT(x) = IDFT(x).
(If real, then even)
So real-odd not possible



and sample 0 to N.
This gives periodic & discrete time signal.

(d) $\frac{1}{\sqrt{4}}\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & -j & -1 & j \\ 1 & -1 & 1 & -1 \\ 1 & j & -1 & -j \end{bmatrix}$ for DFT

(e) take $x_1 = \begin{bmatrix} 2 \\ 2 \\ 2 \\ 2 \end{bmatrix}$ or $\begin{bmatrix} c \\ c \\ c \\ c \end{bmatrix}$ & add $x_2 = \frac{1}{2}\begin{bmatrix} 4c \\ 0 \\ 0 \\ 0 \end{bmatrix}$ (x_2 = DFT x_1) and both are even periodic.

$(x_1 + x_2)$ achieves requirement

Q-3 Soln in Oppenheim.

Q-4 (a) Gaussian appropriately normalized (variance to be chosen).

(b) period & scaling of Impulse train to be chosen.

Q-5 Find z-transform & convert to difference eqn.

Q-6 possible for each case: take z-transform.

Q-7: (a) Not possible

(e) pure delay: $5e^{-6T}$: differential eqn not possible

Q-8: 7a is FIR, 7b, c, d – IIR | Q-5 – FIR, Q6 d
7e differential Q-6 a, b, c – IIR.
⇒ difference eqn possible ≡ finite memory.