

Mid term:

Note Title

01-10-2007

$$y_1[m] = x[2m]$$

$$y_2[m] = x[2m+1]$$



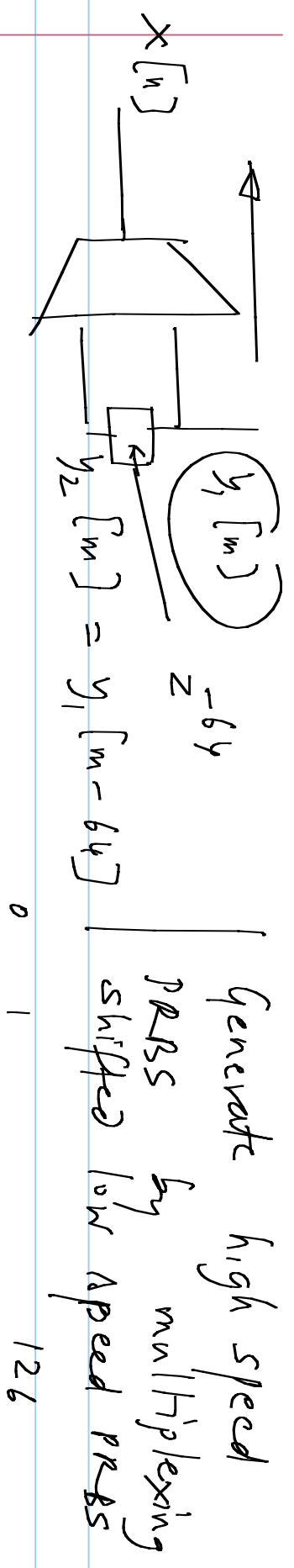
$$\bullet x[n] = \frac{x[n-6]}{x[n-1]} \oplus \frac{x[n-7]}{x[n-7]}$$

$$y_1[m] = x[2m] = x[2m-6] \oplus x[2m-7]$$

$$y_1[m-6] = x[2m-12] \oplus x[2m-13] \oplus x[2m-14]$$

$$y_1[m-7] = x[2m-14] \oplus x[2m-13] \oplus x[2m-12] \oplus x[2m-14]$$

$$= x[2m-12] \oplus x[2m-14] \\ = y_1[m-6] \oplus y_1[m-7]$$



$n$	0	1	2	...	125	126	127	128	...	253	254
											↑

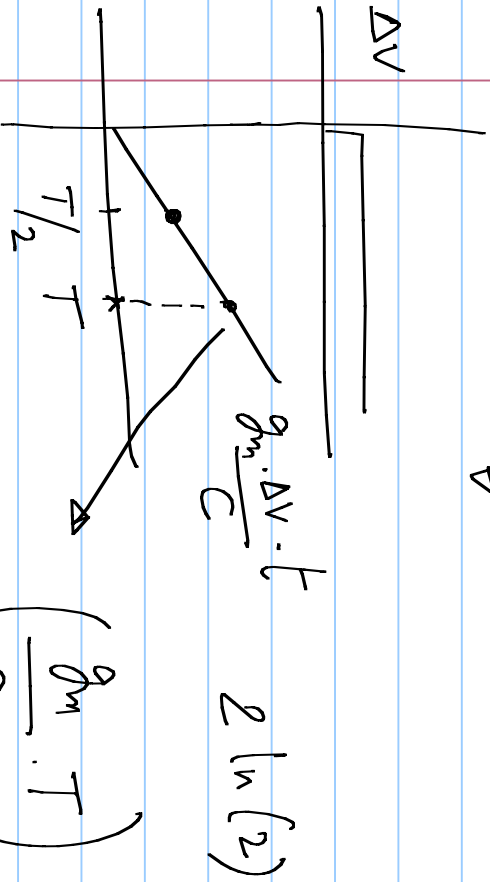
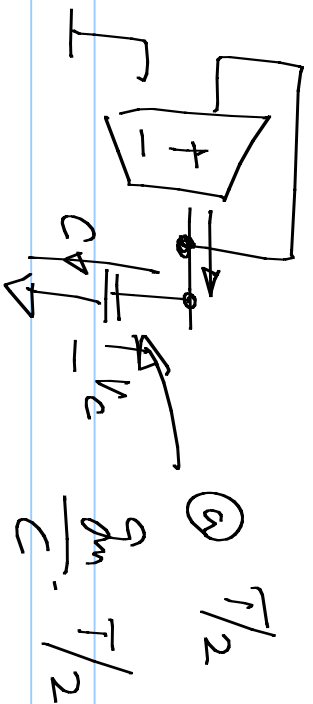
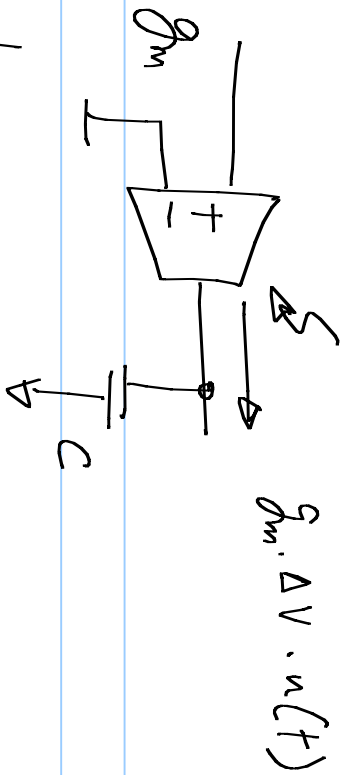
$y_1$	0	2	4	...	126	128	130	...	252
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$y_2$	1	3	5	...	125	127	129	...
					0	2		

$$y_2[m] = y_1[m-64]$$

PRBS-N sequence

- Demux by 2  $\Rightarrow$  2 PRBS-N sequences
  - The output sequences are shifted versions
- Shift = 2



$$V_c \cdot g_m = C \cdot \frac{dV_c}{dt}$$

$$(t - T/2) \cdot \frac{g_m}{C}$$

$$V_c(t) = V_c\left(\frac{T}{2}\right) \cdot e^{-\left(\frac{g_m}{C} \cdot T/2\right) \cdot (t - T/2)}$$

$$\textcircled{a} T: V_c(T) = \left(\frac{g_m T}{C}\right) \cdot e^{-\left(\frac{g_m}{C} \cdot T/2\right) \cdot T}$$

$$\left(\frac{g_m}{C} \cdot T\right)$$

Super regenerative receivers

# Equalizer:

$$1 + 0.5z^{-1}$$

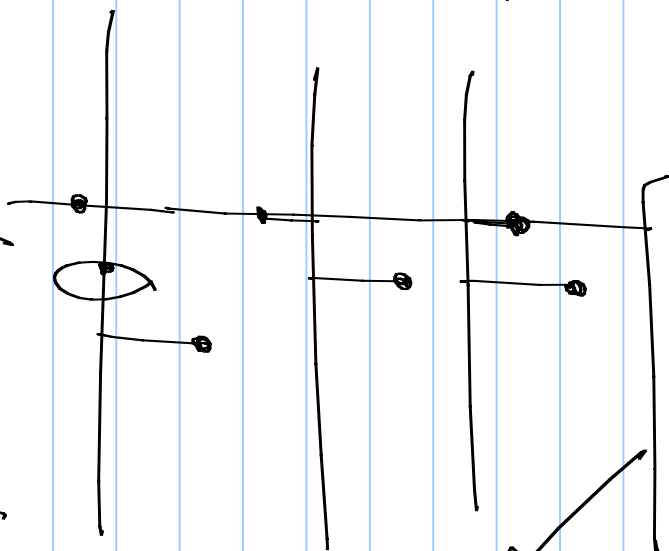
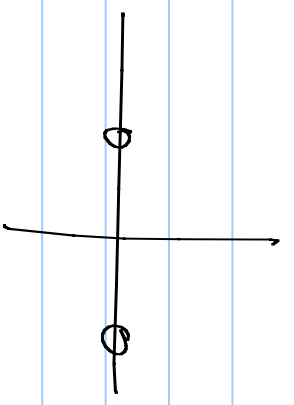
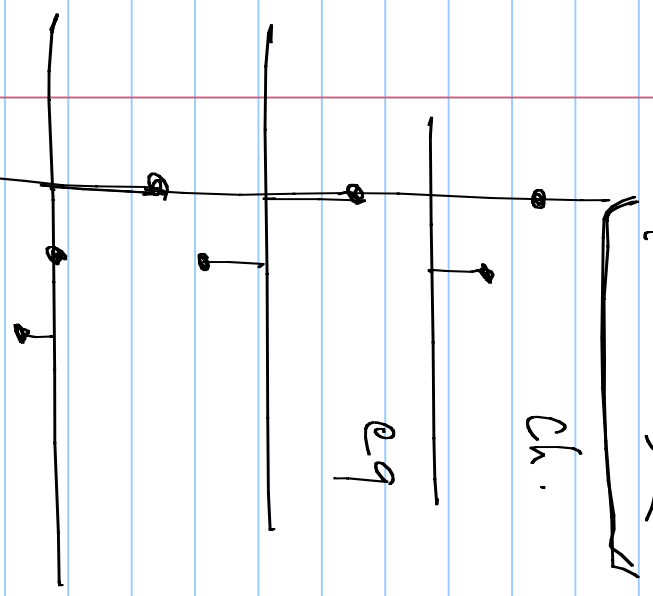
$$R=0.5$$

$$1 - 0.5z^{-1}$$

$$(-4)(-0.5 + z^{-1}) = 2 - 4z^{-1}$$

$$0.5 + z^{-1}$$

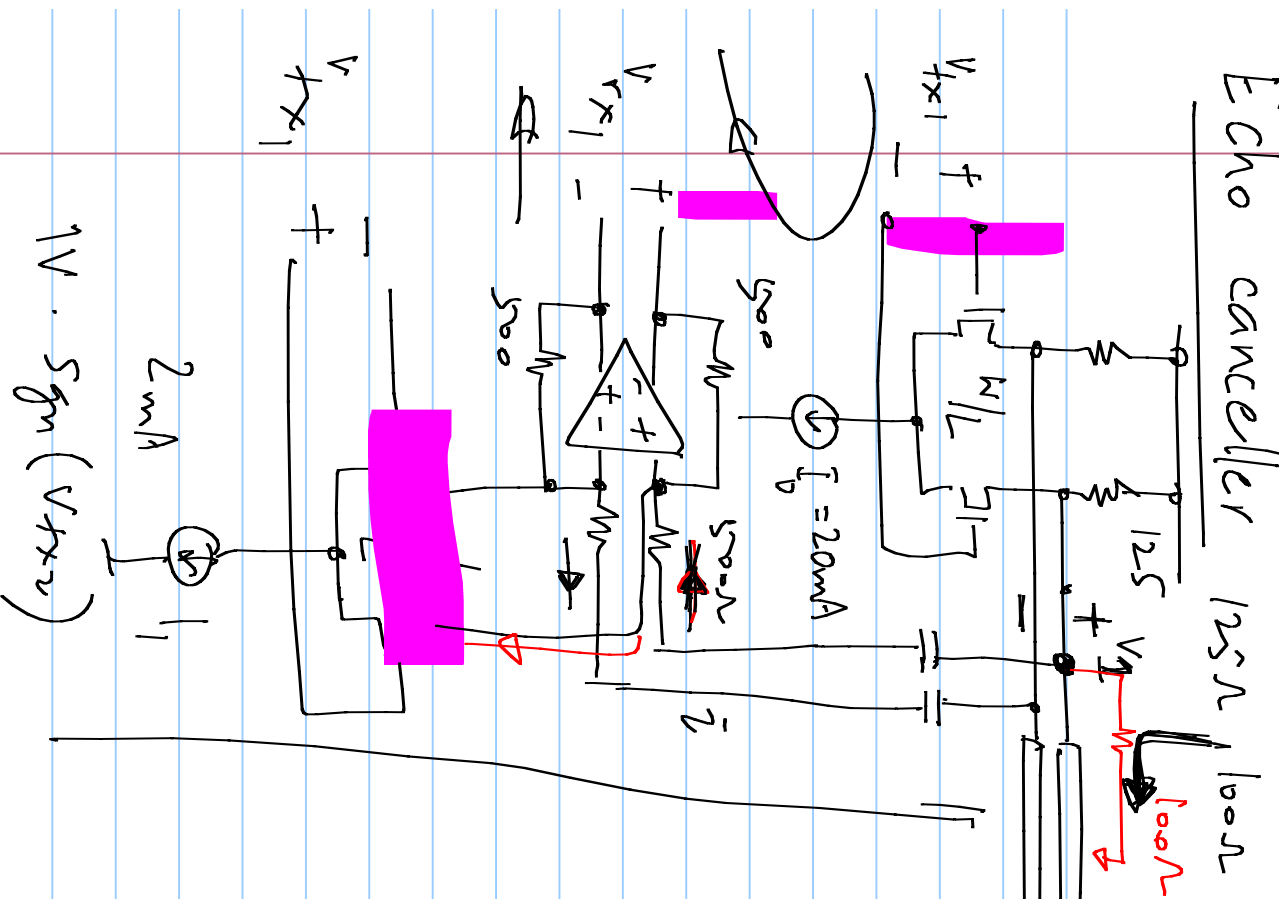
$$R=2$$



LHP / inside the unit circle  
to cancel ~~post~~ cursor (s)

RHP / outside the unit circle  
to cancel pre-cursor (s)

# Echo canceller



$$V_1 = (20\text{mA}) (500\Omega) \text{ Sgn}(V_{tx1})$$

$$V_2 = (20\text{mA}) (500\Omega) \text{ Sgn}(V_{tx1})$$

$$V_{tx1} = -(I_0 \cdot 500) \cdot \text{Sgn}(V_{tx1}) \quad \text{Echo}$$

$$V_{tx1} = (I_0 \cdot 500) \cdot \text{Sgn}(V_{tx1}) \quad \text{Canceller}$$

