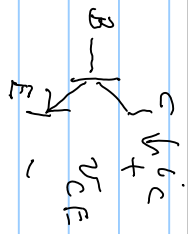
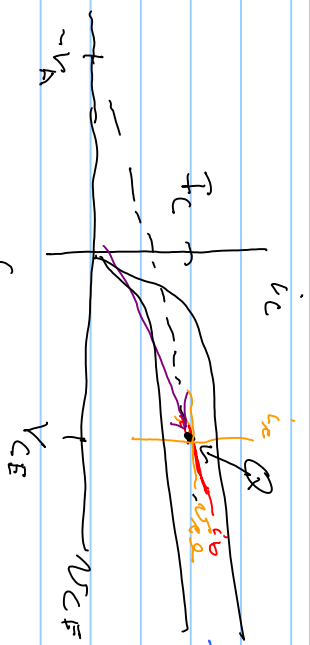


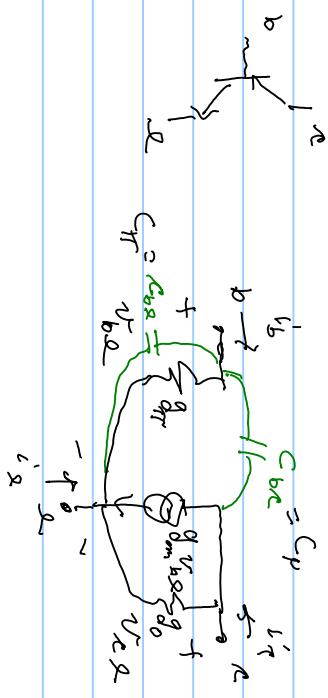
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02/20/17



$V_A = \text{early voltage}$



Linearize about Q point for small signals
 $i_c \approx i_{CQ} + I_C$
 $|i_c| \text{ small}$



$g_m = \frac{I_C}{V_T}$
 $g_m = \frac{1}{r_e}$
 $g_m = \frac{1}{r_e} = \text{input conductance}$

$I_E = I_C = I_Q = \text{output conductance}$

$g_m = \text{mutual conductance}$

$v_{be} = R_i i_b$, R_i in ohms, $R_i = \frac{1}{R_s + r_{be}}$
 $i_b = \frac{1}{R_s} v_{be}$, $G_{is} = \frac{1}{R_s}$, G_{is} in ohms, $\frac{1}{R_s} = \frac{1}{R_s}$
 $T = I_C / V_T$

$$N = V_C + V_R, \quad V_R = R i_c$$
$$V_C = \frac{1}{C} i_c, \quad \omega = \text{compley frequency}$$
$$= \sigma + j\omega$$

$$i = f(a) \sim \frac{1}{f(a)} = \frac{1}{\text{admittance}} = \frac{1}{\frac{1}{R + \frac{1}{R_C}}} = \frac{R_C}{1 + R_C}$$

[illegible]

transient

with $C_A \Rightarrow Y = \left[\begin{matrix} g_m + C_p A + C_p A & -C_p A \\ g_m - C_p A & g_o + C_p A \end{matrix} \right] = Y(s)$

transient
 $\Rightarrow$ if apply a sinusoid, nothing at this "transients", result & die out if the circuit is stable resulting in the sinusoidal steady state, $\Rightarrow$ "ss"

