Lecture 19 -- Current Mirrors and Active Loads

What is the advantage of a current source load over a resistive load?

How do we make current source loads?

Draw a simple current mirror.

What are the four design parameters we study for current mirrors? What are they for a simple mirror (include a derivation of epsilon)?

Draw a small signal model for a current source loaded common emitter

Draw a load line for a current source load on a common emitter amplifier. What determines the DC value of Vout?

Draw a cascoded current mirror and record its design parameters

A handy table of amplifier properties.

Amp	Rin	Rout	Av
CE	r_π	$r_o \| \| R_C \approx R_C$	$-g_m R_C$
CE w/ degen (neglects r_o)	$r_\pi + (\beta+1)(R_E \| \| r_o) \approx \beta R_E$	R_C	$-\frac{\beta R_C}{r_\pi + (\beta+1)(R_E \| \| r_o)} \approx -\frac{R_C}{R_E}$
EF	$r_\pi + (\beta+1)(R_E \| \| r_o) \approx \beta R_E$	$r_o \| \| R_E \| \| (1/g_m + R_S/\beta) \approx 1/g_m$	$\frac{(\beta+1)(R_E \| \| r_o)}{r_\pi + (\beta+1)(R_E \| \| r_o)} \approx 1$
CB (neglects r_o)	$r_\pi \| \| 1/g_m \approx 1/g_m$	R_C	$g_m R_C$