E151 Lecture 12 Handout

A handy table of resistively loaded 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	$\approx \frac{1}{g_m} + \frac{R_C}{g_m r_o}$	$\approx R_C \| \| \beta r_o$	$g_m R_C$
Cascode	$r_{\pi 1}$	$R_C \| \| (r_{\pi 1} \| \| r_{o1} + r_{o2} + \beta_2 r_{o2}) \approx R_C$	$-g_m R_C$

What is the advantage of an active load (which looks like a current source) over a resistive load?

Draw a load line for an active load on a common emitter amplifier. What determines the DC value of vC?

Draw a small signal model for an actively loaded common emitter. Record its gain.

Draw a small signal model for an actively loaded cascode. Record its gain.

What is the small signal impedance of a diode connected BJT?