HW # 3, due W, 1/22
From: Nilsson *Electric Circuits, 6th Ed.*
Read sections 14.6 & 14.7 (p.736)
Problem 14.33 (p.768 refers to p.687)
Drill 14.12, 14.13 (p.747)
From: *Microelectronic Circuits, 4th Ed.*, prob. 1.42

Stuff

Labs start Wednesday. Bring an old video camera with power supply & audio / video connections if you want to do those parts of lab 1.

Decibels etc.

Start with lecture notes 1/10/03, p.4 & 5

Problem Sessions:
W, 11:50 - 12:40 am, WBB 212 (tall brick geology building)
F, 10:45 - 11:35 am, MEB 1208 (by SW entrance)

Desirable characteristics of amplifiers

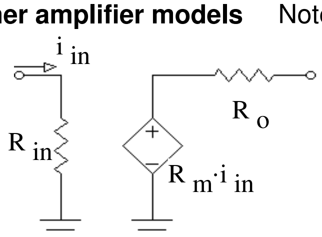
Want R_{in} --> ∞ High input resistance means the amplifier will not load down the source or previous stage.

Want R_o --> 0 Low output resistance means the amplifier supply lots of current to the load or next stage.

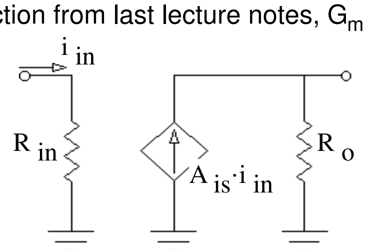
High R_{in} and low R_o means good current gain. In fact these terms are used much more often than "current gain".

At higher frequencies it may become more important to match impedances than to maximize R_{in} & minimize R_o.

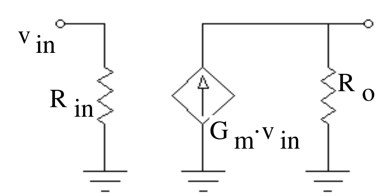
Other amplifier models Note correction from last lecture notes, G_m & R_m were reversed



Transresistance amplifier



Current amplifier



Transconductance amplifier

Instead of $A_{vo} = \frac{v_o}{v_{in}}$ (unloaded)

This amp has $R_m = \frac{v_o}{i_{in}}$ (unloaded)

$\frac{V}{I} = \Omega$, that's why it's called transresistance

Insterad of $A_{vo} = \frac{v_o}{v_{in}}$ (unloaded)

This amp has $G_m = \frac{i_o}{v_{in}}$ (unloaded)

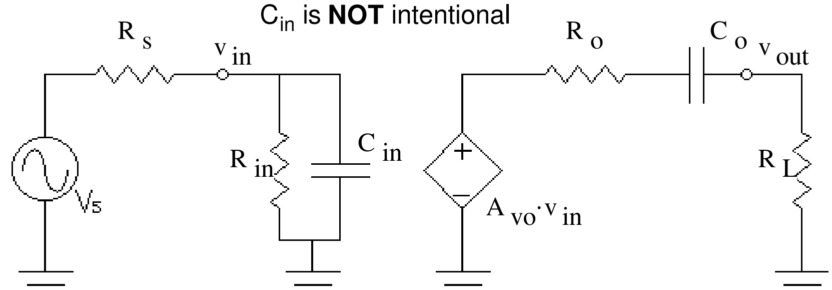
$\frac{I}{V}$ = conductance, that's why it's called transconductance, units mho or seimen

See p.24 in text for more details

Z_{in} & Z_{out}

C_{in} is inevitable. All points in the circuit will exhibit some capacitance to all others. Because R_{in} is often quite high, and because this is a sensitive spot in the circuit, the "stray" capacitance at C_{in} is a big deal. Also, C_{in} can actually appear much larger due to something called the "Miller effect".

C_{in} is **NOT** intentional



Coupling capacitors like C_o are very common in amplifiers. They isolate the DC from stage to stage while allowing the signals to go through.

$$Z_{in} = \frac{1}{\frac{1}{R_{in}} + j\cdot\omega\cdot C_{in}}$$

= input impedance

$$Z_o = R_o + \frac{1}{j\cdot\omega\cdot C_o}$$

= output impedance

Frequency Response

C_{in} will cause a high-frequency roll-off & C_o will cause a low-frequency roll-off, so we'd better review filters and Bode plots.

Continue to **Frequency Response & Bode Plot Examples**