

# Lec 31

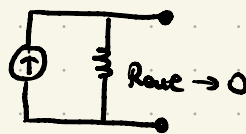
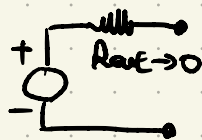
## Foundations for Analysis of Feedback Circuits

- Types of Amplifiers
- Sense and Return Mechanisms

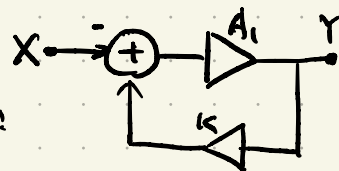
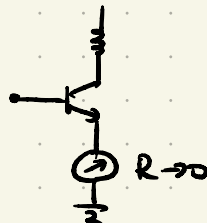
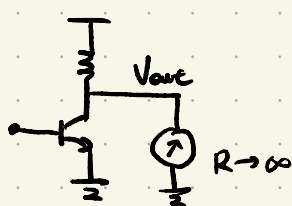
### Review of Lec 30

#### Properties of Feedback:

- "Good" Voltage and Current Sources:

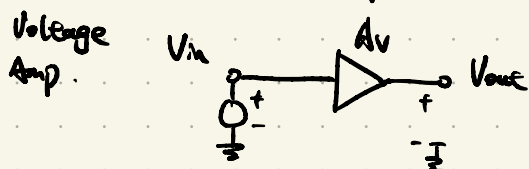


- Sensing Voltages and Currents:

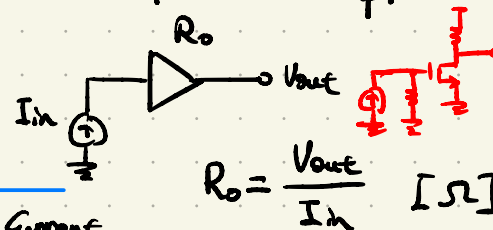


$$\frac{Y}{X} = \frac{A_1}{1 + KA_1} \approx \frac{1}{K}$$

- Types of Amplifiers

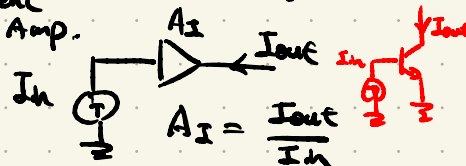


#### Transimpedance Amp.

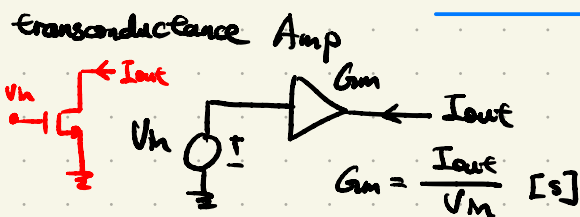


$$R_o = \frac{V_{out}}{I_{in}} [\Omega]$$

#### Current Amp.

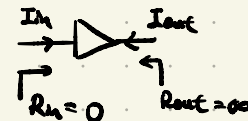
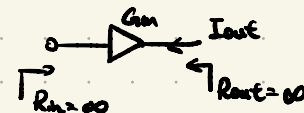
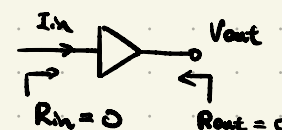
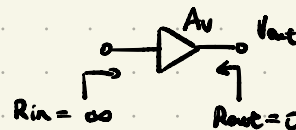


$$A_I = \frac{I_{out}}{I_{in}}$$

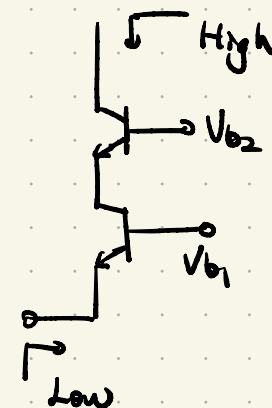
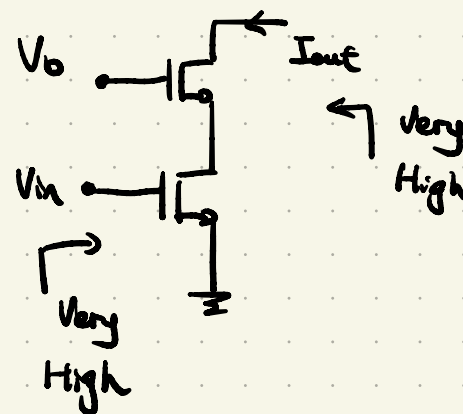
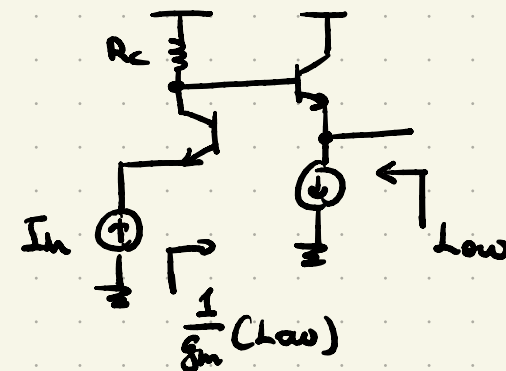
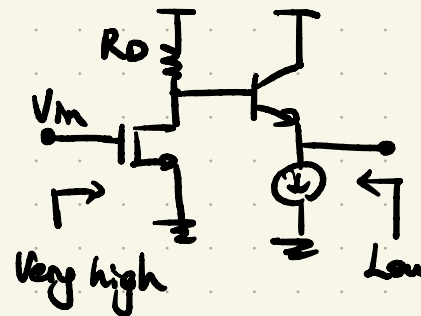


$$G_m = \frac{I_{out}}{V_{in}} [S]$$

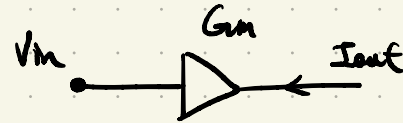
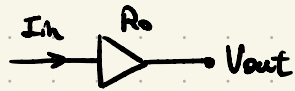
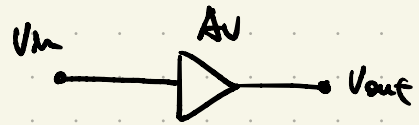
- Input and Output Impedances of Four Amp. Topologies



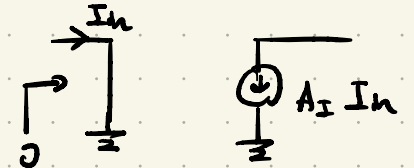
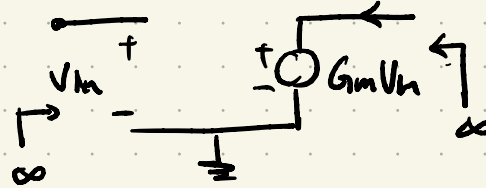
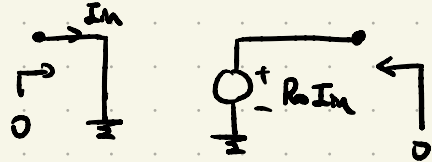
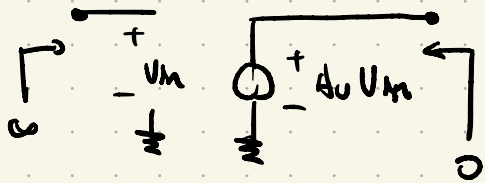
### Examples of Amp. Implementations



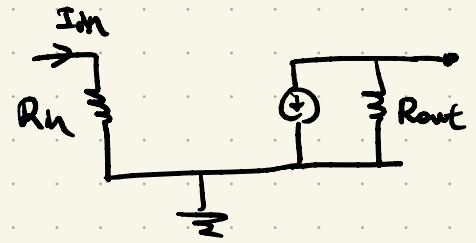
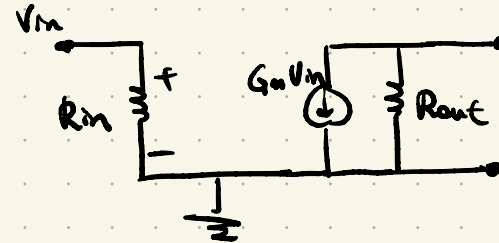
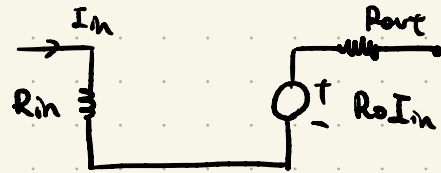
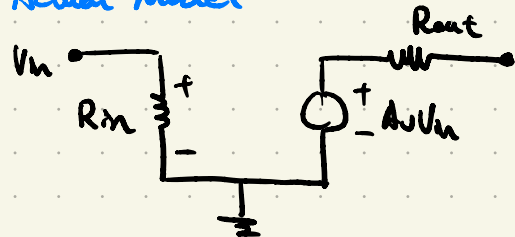
# Models of Four Amp. Topologies



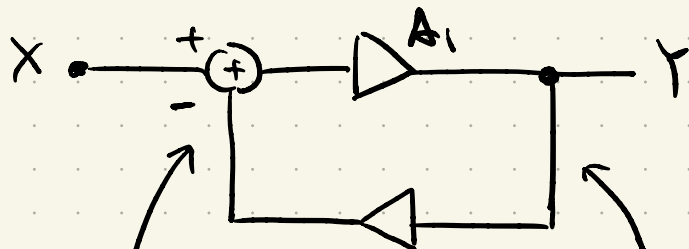
## Ideal Model



## Actual Model



## Sense & Return Mechanisms



How do we  
return a voltage or  
a current

How do we sense?