

### **Problem 1**

For each of the circuits below,

1. Determine analytical expressions for  $r_{in}$  and  $r_{out}$
2. Based upon the results found in (1), determine whether the circuit is best characterized as a voltage, current, transconductance, or transresistance amplifier
3. Based upon the result in (2), determine an analytical expression for the proportionality constant of the dependent source in the 2-port model (i.e. if answer to (2) was a transconductance amplifier, determine an analytical expression for  $G_m$ )





