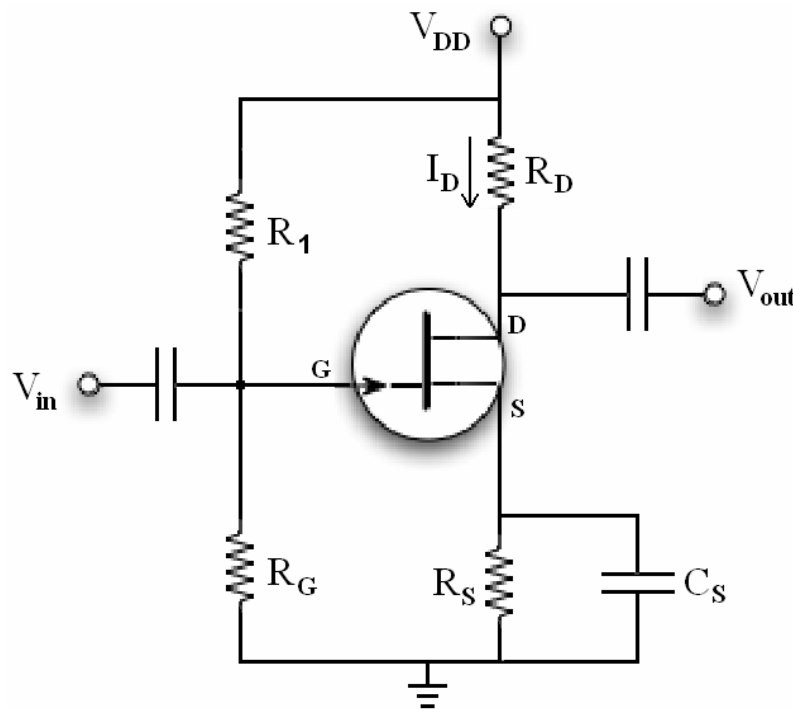


### Problem T5

Consider the following common source JFET amplifier circuit. Notice that it includes an additional bias resistor,  $R_1$ , compared to the usual self-biasing circuit.

Assume that transistor achieves the desired transconductance with  $V_{GS} = -0.5 \text{ V}$ . However, due to design constraints, the voltage drop across  $R_S$  must be  $7.8 \text{ V}$ . In this case, the self-biasing approach for  $V_{GS}$  cannot work.



- If  $V_{DD} = 10.0 \text{ V}$  and  $R_G = 1 \text{ M}\Omega$ , what value of  $R_1$  is required to bring  $V_{GS}$  to  $-0.5 \text{ V}$ ?
- Is the input impedance compromised (i.e. smaller) as a result of the additional bias resistor?
- What is the input impedance with and without the inclusion of  $R_1$ ?