TSTE86 Homework 1: Operating modes

The following parameters apply to the MOSFET shown in Figure 1.

Threshold voltage for $V_{SB} = 0$	V_{T0}	=	0.43 V
Body-effect coefficient	γ	=	0.40 V$^{1/2}$
Velocity saturation voltage	V_{DSAT}	=	0.63 V
Process transconductance	k'	=	115 μA/V^2
Channel length modulation	λ	=	0 V^{-1}
Fermi potential	ϕ	=	–0.30 V

Plot V_{out} vs. V_{in} for the circuit with V_{in} varying from 0 to 2.5 V in steps of 0.5 V. For each point, determine the operation mode of the MOSFET as well as drain current I_D. The bulk terminal is connected to ground.
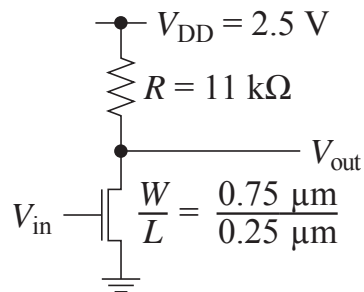

Figure 1. NMOS circuit.