TSEI03 Homework 1: Operating modes

The following parameters apply to the MOSFET shown in the circuit 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	$\mu A/V^2$
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.

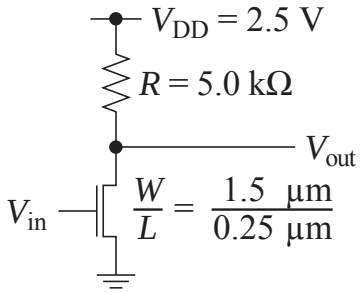

Figure 1. NMOS inverter.