Lab 1

(Lecture 3)

HSPICE

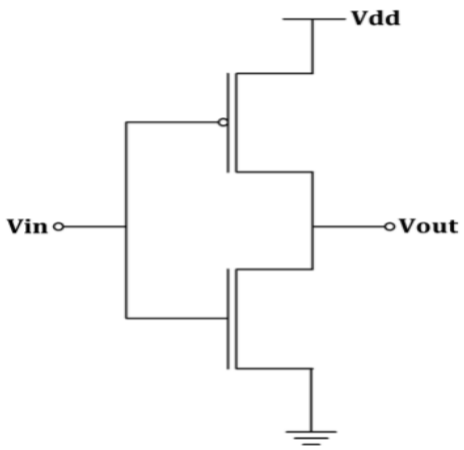

Figure 1

The code below contains the description of a CMOS inverter to be performed by SPICE. The schematic of the circuit is shown in Figure 1.

```
Simple CMOS Inverter

.lib '/home/ff/ee141/MODELS/gpdk090_mos.sp' TT_S1V

**Begin Circuit Netlist**

**Power Supplies**

VDD vdd 0 1.2
VIN in 0 PULSE 0 1.2 200ps 100ps 100ps 2ns 4ns

**Transistors**

M0 out in vdd vdd gpdk090_pmos1v L=100e-9 W=120e-9 AD=69.6e-15 AS=69.6e-
15 PD=1.16e-6 PS=1.16e-6 M=1
M1 out in 0 0 gpdk090_nmos1v L=100e-9 W=120e-9 AD=69.6e-15 AS=69.6e-15
PD=1.16e-6 PS=1.16e-6 M=1

**Control Information**
.options post=2 nomod
.op

**Transient Analysis**
.tran .01ns 3ns

**DC Analysis**
.dc VIN 0 1.2 0.001


.END
```

Transform the CMOS inverter into an NMOS inverter with a passive load. Replace the PMOS transistor with a resistor as shown in Figure 2

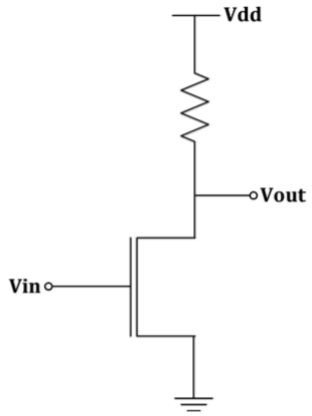

Figure 2

Edit the HSPICE file by replacing the PMOS transistor with a 20k resistor in your netlist.

Replace the line for M1 with this line:
R0 1.2 out 20000