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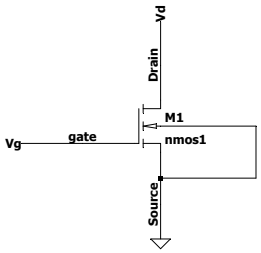
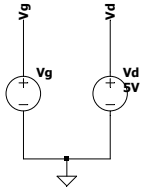
Analog_VLSI LAB_1
Task: 2 small signal analysis - Vds constant Vgs varing






```
.model nmos1 nmos [vto=0.7V L=2um W=10um lambda=0.00 kp=50u gamma=0.0]
.dc Vg 0 2.5 0.1

.meas Id FIND Id(M1) WHEN V(Gate)=1.8V
.meas gm FIND d(Id(M1)) WHEN V(Gate)=1.8V
.meas Ron FIND 1/d(Id(M1)) WHEN V(Gate)=1.8V

.meas Id_1 FIND Id(M1) WHEN V(Gate)=2V
.meas gm_1 FIND d(Id(M1)) WHEN V(Gate)=2V
.meas Ron_1 FIND 1/d(Id(M1)) WHEN V(Gate)=2V

.meas Id_2 FIND Id(M1) WHEN V(Gate)=2.2V
.meas gm_2 FIND d(Id(M1)) WHEN V(Gate)=2.2V
.meas Ron_2 FIND 1/d(Id(M1)) WHEN V(Gate)=2.2V
```

By Calculation

Vgs = 1.8V
---
id: id(m1)=151.25u at 1.8
gm: d(id(m1))=275u at 1.8
ron: 1/d(id(m1))=3633 at 1.8

Vgs = 2.0V
---
id_1: id(m1)=211.25u at 2
gm_1: d(id(m1))=325u at 2
ron_1: 1/d(id(m1))=3076 at 2

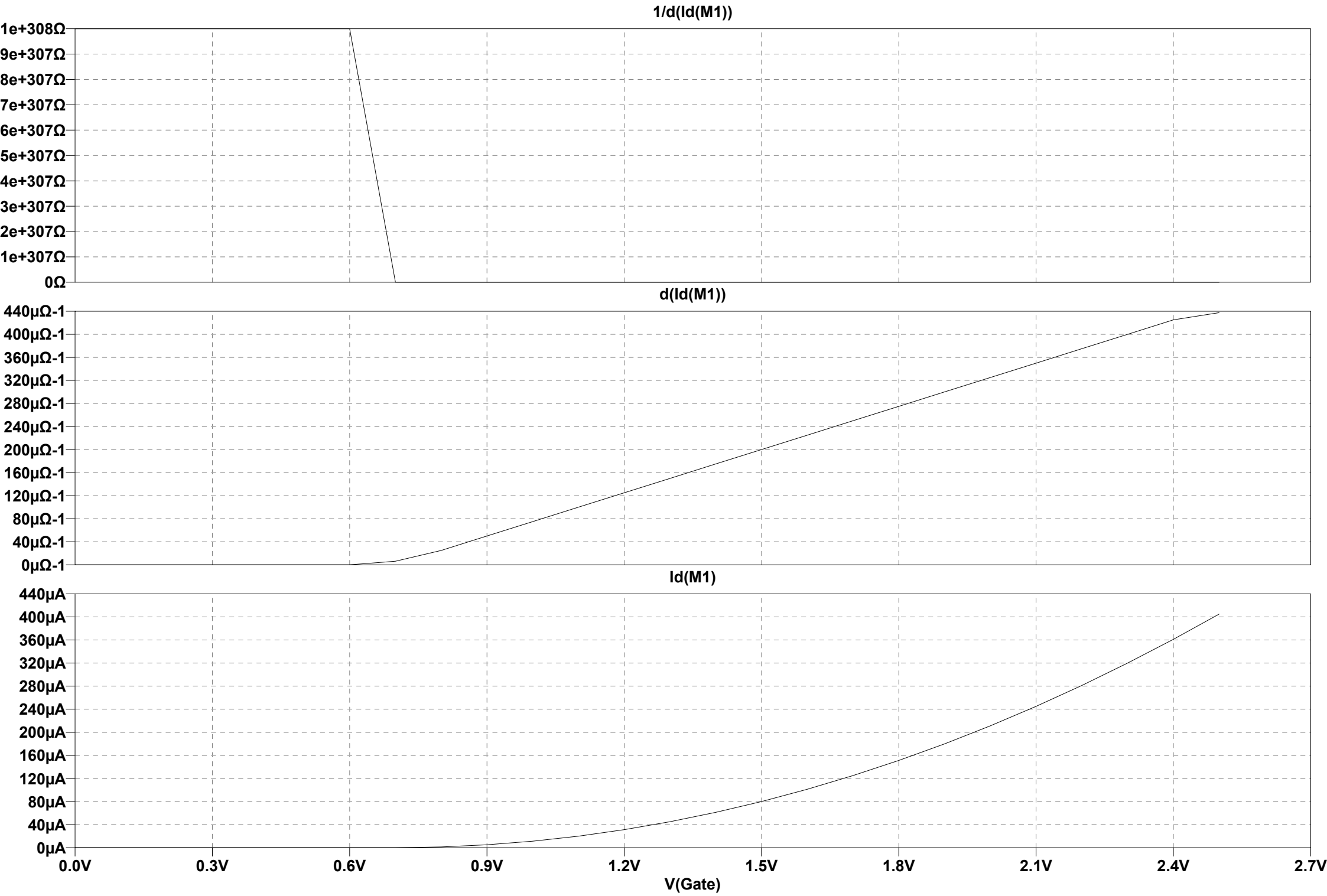
Vgs = 2.2V
---
id_2: id(m1)=281.25u at 2.2
gm_2: d(id(m1))=375u at 2.2
ron_2: 1/d(id(m1))=2666 at 2.2

By Simulation

Vgs = 1.8V
---
id: id(m1)=0.00015125 at 1.8
gm: d(id(m1))=0.0002875 at 1.8
ron: 1/d(id(m1))=3478.26 at 1.8

Vgs = 2.0V
---
id_1: id(m1)=0.00021125 at 2
gm_1: d(id(m1))=0.000325 at 2
ron_1: 1/d(id(m1))=3076.92 at 2

Vgs = 2.2V
---
id_2: id(m1)=0.00028125 at 2.2
gm_2: d(id(m1))=0.0003625 at 2.2
ron_2: 1/d(id(m1))=2758.62 at 2.2


1/d(Id(M1))
1e+308Ω
9e+307Ω
8e+307Ω
7e+307Ω
6e+307Ω
5e+307Ω
4e+307Ω
3e+307Ω
2e+307Ω
1e+307Ω
0Ω
d(Id(M1))
440μΩ-1
400μΩ-1
360μΩ-1
320μΩ-1
280μΩ-1
240μΩ-1
200μΩ-1
160μΩ-1
120μΩ-1
80μΩ-1
40μΩ-1
0μΩ-1
Id(M1)
440μA
400μA
360μA
320μA
280μA
240μA
200μA
160μA
120μA
80μA
40μA
0μA
0.0V
0.3V
0.6V
0.9V
1.2V
1.5V
1.8V
2.1V
2.4V
2.7V
V(Gate)