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Homework #3
(Due 9/16/02)

EECS 140
Fall 2002

- 1) Using SPICE, plot the $I_{DS}-V_{DS}$ characteristics of the nmos and pmos transistors given below, for $|V_{DS}|$ from 0 to 1.2 V and $|V_{GS}| = 0.6$ V, 0.8 V, 1 V. Assume $W=10$ μm and $L=0.13$ μm .
- 2) Using SPICE, plot the $(g_m/I_{DS}) - V_{GS}$ and $(g_m r_o) - V_{GS}$ characteristics for the nmos and pmos transistors give below, for $|V_{GS}|$ from 0 to 1.2 V and $|V_{DS}| = 1$ V. Assume $W=10$ μm and $L=0.13$ μm .

```
.model nmos
+ nmos level=1 tox=2.6n vt0=0.3 gamma=0.2 phi=0.6 u0=250 ld=0.025u
+ capop=0 acm=3 ldif=0 hdif=0.2u cj=8e-4 cjsw=8e-12 cjgate=8e-11
+ lambda=0.2
```

```
.model pmos
+ pmos level=1 tox=2.6n vt0=-0.3 gamma=0.2 phi=0.6 u0=100 ld=0.025u
+ capop=0 acm=3 ldif=0 hdif=0.2u cj=8e-4 cjsw=8e-12 cjgate=8e-11
+ lambda=0.15
```