(b) Calculate the drain current.

+3 V

50 $k\Omega$

V_G

−3 V
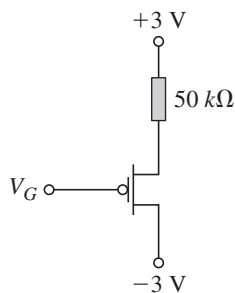
3-33. Given $V_{tp} = -0.6$ V, $K_p = 50 \, \mu A/V^2$, $W/L = 3$, and $V_D = 0.8$ V, if $V_o = 1.2$ V, what are R and V_G?
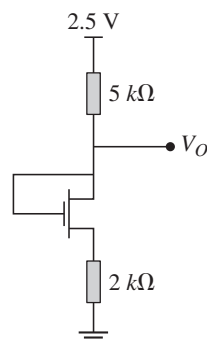

3 V

100 $k\Omega$

V_O

V_G

R
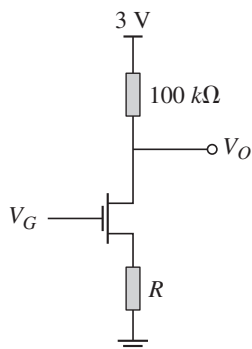
3-34. Given $V_{tp} = -0.6$ V, $K_p = 50 \, \mu A/V^2$, $W/L = 3$, and $V_D = 0.8$ V, if $V_o = 1.2$ V, what is R?

+2 V

133 $k\Omega$

V_{O1}

0 V

R

−2 V
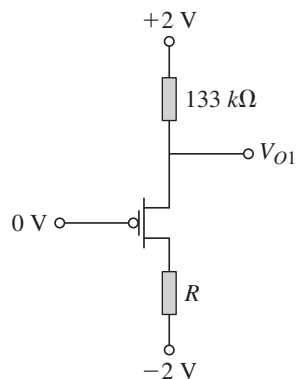
3-35. If $K_n = 90 \, \mu A/V^2$, $V_{tn} = 0.5$ V, and $W/L = 10$, calculate I_D and V_O.

2.5 V

5 $k\Omega$

V_O

2 $k\Omega$

Body Effect and Threshold Voltage

3-36. The nMOSFET has: $V_{tn0} = 0.5$ V, $K_n = 200$ $\mu A/V^2$, $\phi_F = -0.35$ V, $W/L = 3$, and the body effect constant $\gamma = 0.1$ V$^{1/2}$. The bulk voltage is at −0.3 V with respect to the source. Calculate I_D.

2 V

1 V   −0.3 V
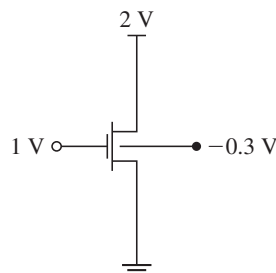
3-37. An nMOSFET threshold voltage is measured as 0.62 V when it should be 0.60 V. A parasitic source to substrate voltage is suspected of raising V_{tn}. If $\gamma = 0.4$ V$^{1/2}$ and $\phi_F = 0.35$ V, what would be the V_{BS} of this suspected mechanism?

3-38. $V_{t0} = 0.6$ V, $\gamma = 0.25$ V$^{1/2}$, and $\phi_F = 0.35$ V. Calculate V_O.

2 V V_O

2 V