ECE 342: Electronic Circuits **Summer 2026**
Problem Set #3 **Due Date: 5pm, Tue, Jun 30, 2026**

1. For a MOSFET, If $\mu C_{ox}\dfrac{W}{L} = 0.4$ mA/V^2 and $V_T = 0.8$ V, use $V_{GS} = 2$V and

$$I_D = \mu C_{ox}\frac{W}{L}\left[\left(V_{GS} - V_T\right)V_{DS} - \frac{V_{DS}^2}{2}\right]$$

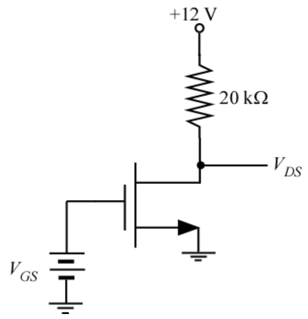
(a) Calculate the pinchoff drain current.

(b) What is the minimum value of V_{DS} that leads to pinchoff?

2. For the MOSFET circuit shown, $\mu, WC_{ox}/2L = 80\ \mu\text{A}/\text{V}^2$, $V_T = 0.9$ V, and $\lambda = 0$.

(a) What value must V_{GS} have to bring the device from the active region to the edge of the cutoff region?

(b) What value must V_{GS} have to bring the device from the active region to the edge of the triode region?



3. In the circuit of Problem 2, identify the region in which the MOSFET exists for the following conditions:

(a) $V_{GS} = 2.84$ V, $V_{DS} = 6$ V

(b) $V_{GS} = 3.27$ V, $V_{DS} = 3$ V

(c) $V_{GS} = 3.46$ V, $V_{DS} = 2$ V

4. A MOSFET with $V_T = 1$ V has the following measured data taken:

V_{GS}, (V)	V_{DS}, (V)	I_D, (μA)
2	1	80
2	8	89

Calculate λ for this device.