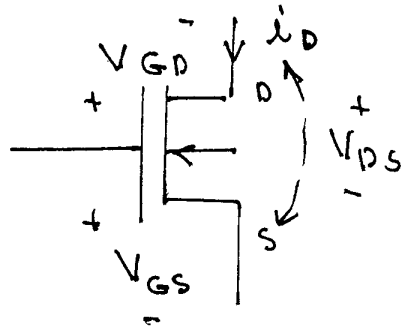
Problem 6 Problem Set 4 12.2

part a)

n-channel mos fett



n channel -

$$i_D = k\left[2(v_{GS} - V_{to})v_{DS} - v_{DS}^2\right]$$

$V_{to} = 1\,V$

$KP = 50\,\mu A/V^2$

$L = 5\,\mu m$

$W = 50\,\mu m$

so $$k = \frac{KP}{2}\frac{W}{L} = 50\,\mu A/V^2 \times \frac{1}{2}\frac{50}{5} = 250\,\mu A/V^2$$

$$V_{GD} = V_{GS} - V_{DS}$$

cut-off $V_{GS} = V_{to} = 1\,V$

Boundary between triode and saturation

$$v_{DS} = (V_{GS} - V_{to}) = V_{GS} - 1$$

$$\therefore i_D = k\left[2(v_{GS} - V_{to})v_{DS} - v_{DS}^2\right] \text{ for } v_{DS} < V_{GS} - V_{to}$$

$i_D = 0$ for cut-off ($V_{GS} = V_{to}$)

$i_D = k\left[(v_{GS} - V_{to})^2\right]$ in saturation region