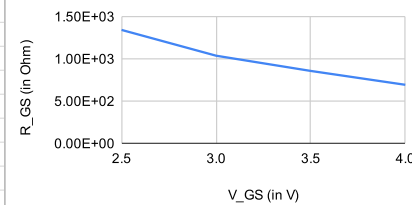


# Part 1

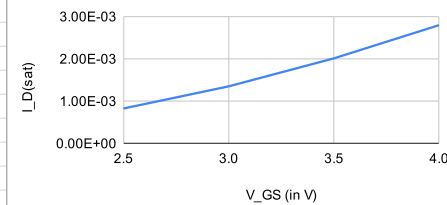
For  $R_{GS}$ , I took the rightmost point of the  $V_{ds}/I_{ds}$  curves

$V_{GS}$ (in V)	$R_{DS}$ (in Ohm)	$I_D(sat)$	$R_O$
2.5	1.35E+03	8.31E-04	4.16E+04
3	1.04E+03	1.36E-03	2.66E+04
3.5	8.60E+02	2.02E-03	1.69E+04
4	6.96E+02	2.80E-03	1.32E+04

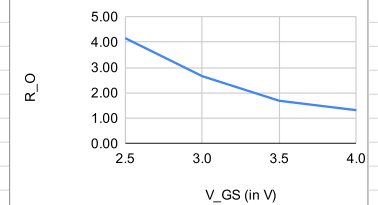
$R_{GS}$  (in Ohm) vs  $V_{GS}$  (in V)



$I_D(sat)$  vs.  $V_{GS}$  (in V)



$R_O$  vs.  $V_{GS}$  (in V)



For Early Voltage ( $V_A$ ) and  $R_O$

$$R_O = V_A / I_D(sat)$$

$V_{GS} = 2.5$

x0	4.68182	y0	0.000827586	slope	0.000021072380	$I_D(sat)$	8.31E-04
x1	3.86364	y1	0.000810345	y-intercept	0.000728928909	$R_O$	4.16E+04
				x-intercept	-34.5916742	$V_A$	

$V_{GS} = 3V$

x0	4.68182	y0	0.00134828	slope	0.000033086154	$I_D(sat)$	1.36E-03
x1	3.63939	y1	0.00131379	y-intercept	0.00119337658	$R_O$	2.66E+04
				x-intercept	-36.06876047	$V_A$	

$V_{GS} = 3.5V$

x0	4.9303	y0	0.00201379	slope	0.000051725	$I_D(sat)$	2.02E-03
x1	3.7303	y1	0.00195172	y-intercept	0.001758770233	$R_O$	1.69E+04
				x-intercept	-34.00232446	$V_A$	

$V_{GS} = 4V$

x0	4.81515	y0	0.00278621	slope	0.000066774784	$I_D(sat)$	2.80E-03
x1	3.57576	y1	0.00270345	y-intercept	0.002464679397	$R_O$	1.32E+04
				x-intercept	-36.91033105	$V_A$	

# Part 2

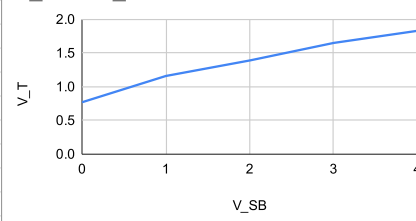
$K = u_n C_{ox} (W/L)$  Linear Region

x0	3.47385	y0	0.000241284	slope	8.94E-05	$g_m$	
x1	2.70462	y1	1.72E-04	y-intercept	-6.94E-05		
				x-intercept	0.78	$V_T$	

Saturation Region

x0	4.56667	For $K$ ,	0.01561	Slope			
y0	0.00383333	$K = (Slope)^2 \cdot 2$	0.0004873442				
		$V_T = 0.7$					

$V_T$  vs.  $V_{SB}$



# Part 3

$V_{SB}$

0	0.77		
1	1.16	gamma	0.914
2	1.39		
3	1.65		
4	1.83		

# Part 4

Wp = 60um	Wn = 30um			Wp = 30um	Wn = 60um			Wp = 60um	Wn = 60um		
ViH	1.56872	ViL	1.006	ViH	1.83408	ViL	1.25949	ViH	1.33367	ViL	0.810345
VoL	0.317089	VoH	3.08958	VoL	0.34104	VoH	3.02687	VoL	0.271519	VoH	3.18247

$V_{dd} = 1.5V$

$V_{dd} = 3V$

Vdd	tp
2.00	9.5E-11
2.25	8.8E-11
2.50	7.0E-11
2.75	6.2E-11
3.00	6.0E-11
3.25	5.5E-11