Book: 2.5, 2.6, 2.7, 2.8

Large signal consideration

3.1, 3.2, 3.3, 3.4
3.12, 3.13, 3.14, 3.19
4.4, 4.5, 4.6, 4.7

7.1, 7.2, 7.6 (Noise)

\[ V_{in} - 3V \]
\[ V_{out} = f(V_{in}) \]
\[ V_{out} \text{ max } V_{in} \text{ to keep all devices saturated} \]

\[ V_{in} - 0V \]

Transfer function? (vs. freq.)
Input referred noise?

Design to meet \( U(6, BW) \geq 100 \text{MHz} \)
\( V_n^2 \leq 3nV/\sqrt{\text{Hz}} \)
\( I_0 \leq 100 \mu A \)
\( V_{out, \text{min}} \leq 200 \text{mV} \)

Neglect \( C_gd, gds \). What is the transfer function?
Where are the two poles?

Design for \( > 100 \text{MHz} \) bandwidth.
What is max \( V_{out} \)?
For $V_{i_n^+} = V_{i_n^-} = V_{CM_{min}} \ldots V_{CM_{max}}$
calculate $V_{CM_{min}} = f(H_{diff}, \frac{w}{L})$
$V_{CM_{max}} = f(H_{diff}, \frac{w}{L})$
$V_{out_{min, max}} = f(V_{CM}, I_{tail}, \frac{w}{L})$

all devices in saturation.
neglect $g_{ds}$.

Transfer function?
Conditions for saturation of all FETs

Large signal analysis $I_{out} = f(V_{in})$
Small signal analysis $I_{out} = f(V_{in})$
neglect $g_{ds}, g_{mb}$