Assignment #1 – Review Problems

Problem #1 (10 pts)

Given the amplifier shown in Fig. 1 find an expression for the overall voltage gain in terms of gm1 and ro1 for Q1 and gm2 and ro2 of Q2. Assume the bias sources have very high output resistance.
Problem #2 (90 pts)

[Hint: do the problem carefully. Though the problem is quite tedious it provides excellent inside on how to “guess” in which operating region a transistor work].

For the circuit in Figure 2, let $|V_{TH}| = 2V$. For each of these cases:

(a) $K_p(W/L)_p = K_n(W/L)_n$
(b) $K_p(W/L)_p = 0.1*K_n(W/L)_n$
(c) $K_p(W/L)_p = 0.01*K_n(W/L)_n$

Find $v_{out}$ corresponding to $v_{in} = 0V, 3V, 6V$. 

![Figure 2](image-url)