1. The cross-section and top-view of an NMOS transistor are shown below. The length of the channel is 5\(\mu\)m. The width of the channel changes linearly from 1\(\mu\)m at the source to 0.3\(\mu\)m at the drain. Derive the expression for the device current when operating in the linear region as a function of \(\mu_n\), \(C_{ox}\), \(V_{GS}\), \(V_{DS}\) and \(V_{TH}\). Assume \(\lambda=0\).

2. Sedra & Smith, Problem 6.15

3. Indicate the region of operation for a npn transistor biased as follows:
   (a) \(V_{BE} = 0.7V\), \(V_{BC} = 0.7V\)
   (b) \(V_{BE} = 0.7V\), \(V_{BC} = -2V\)
   (c) \(V_{BE} = -0.7V\), \(V_{BC} = -2V\)
   (d) \(V_{BE} = -1V\), \(V_{BC} = -2V\)
   (e) \(V_{BE} = -1V\), \(V_{BC} = 0.7V\)

4. Sedra & Smith, Problem 6.51

5. Sedra & Smith, Problem 6.59

6. Find the transistor operating points, \(V_C\) and \(V_E\) in the following circuits. \(\beta = 60, V_{BE}(nnp) = 0.7V, V_{EB}(pnp) = 0.7V\)
7.