

Massachusetts Institute of Technology
6.101 Analog Electronics Lab
Spring 2007
Problem Set 3
Due Wednesday, March 7, 2007

Refer to Chapters 2 and 5 of *Circuit Analysis and Design, 3rd Edition*
by Donald Neamen for text that supports this problem set.
Remember to use 5% standard resistor values. Assume $V_T=26\text{mV}$

Problem 1. Neamen 6.21 (2nd ed: 4.8)

Problem 2. Neamen 6.42 (2nd ed: 4.40)

Problem 3:

- (a) Draw the small signal equivalent circuit of an NPN common collector (emitter follower) amplifier, with emitter resistor R_E . Express the dependent current source in terms of β and i_b .
- (b) Apply a test voltage source, V_t , to the input of the transistor, with current i_t . Derive equations relating V_t and i_t to circuit parameters R_E , and β . Find the input resistance to the base as $r_i=V_t/i_t$.

Problem 4. Neamen 3.61 (2nd ed: 5.53)