Due Wednesday, February 16th in class (shifted late policy)

This assignment is meant to be a test/warmup of your prerequisite circuits analysis abilities.

For the NPN bipolar transistor, assume that the $V_{BE(on)} = 0.7V$.

1a. (2 pts) If $VCC = 5.00V$, solve for $IB$, $IC$, and $IE$. Assume that $\beta = 100$. Be sure to justify each step that you take.

1b. Resolve this using a $\beta = 200$

2a. (2 pts) If $VCC = 5.00V$, solve for $IB$, $IC$, and $IE$. Assume that $\beta = 100$. Be sure to justify each step that you take.

2b. Resolve this using a $\beta = 10$

3. (2 pts) If $VCC = 5.00V$, and the diode is known to pass 1mA when $V_{diode} = 0.55$, solve for $V1$ and $V2$ using the exponential model of the diode.

4. (2 pts) Derive the transfer function $vb/va$ for the circuit on the right.

5. (2 pts) According to the Ebers-Moll equations, for what value of $V2$ will the collector current drop to zero? Show your derivation. Simplify your answer to its minimum form. Do not drop the ‘-1’ term. What happens to this ‘zero-current VC’ value if we increase the base voltage?