ENGR 356
Exam 1
Review Sheet

This sheet is to help you get ready for Exam 1. First of all some general suggestions:

- Get enough sleep before the exam. This is important, because it has been shown that <u>missing even a moderate amount of sleep is equivalent to being drunk</u>. You don't want that (or to be drunk) while trying to pass any exam. You need to be "bright eyed and bushy tailed" for the exam. You need an agile mind.
- Get enough sleep all through the quarter, because it has been shown that sleeping is necessary to store things in your long term memory. <u>Experiments were done giving groups of people a bunch of things to learn.</u> Then after they were told the facts, half of them took a short nap. Those with the nap remembered the material significantly better than those without the nap. I hope you have been doing this, because there is no way to go back and change it now.
- Don't stress about the exam. It is really unimportant in the long run. What is much more important is that you learn the material well. I realize this, and I realize that some people don't do well with exams. I do the best I can to take that into account when grading, but even so, grades are not as important as your skill sets. Do your best to not stress about grades, but do your best to learn, regardless of the grades you end up with. You will need to continue to learn your whole lifetime, but you won't have to take exams forever.
- You are not allowed a cheat sheet on the exam. You can use your calculator, but please only use it as a calculator, not a cheat sheet, etc. However, if on the exam, you mind goes blank, and you need a little hint, you can come up and I will attempt to give you one. If it enables you to complete the problem, great. It will cost you nothing. But if you need to keep coming back for more and more hints, that will cost you points.

The topics we will cover on this exam are from chapters 2-5 of the text, as well as the labs, even including this week's lab. Here is a list of topics that come to mind as I think about the exam.

1. Four circuit models of amplifiers, and how to find all their parameters (Thevenin's theorem)
   1. What characteristics do ideal amplifiers of each type have?
   2. Cascaded amplifiers
2. Distortion in amplifiers
   1. Linear distortion (changes the frequency response)
   2. Non-linear distortion (causes harmonics, intermodulation distortion, second order, third order, etc.)
   3. DC distortion (due to power supplies)
   4. Miller Effect
3. Operational Amplifiers
   1. With negative feedback (amplifiers)
   2. Without negative feedback (comparitors)
   3. Analysis rules
      1. No current in + or – terminals
      2. If you have negative feedback, $v_+ = v_-$.
      3. Usually writing node equations at the input terminals gives you the v_{out}/v_{in}.
   4. Know various circuits:
      1. Inverting amplifier
      2. Non-inverting amplifiers

3. Inverting summing amplifiers
4. Differential amplifiers
5. Comparator
6. Hysteresis Oscillator
5. Diode
    1. Physics
    2. P and N type material
    3. Forward and Reverse Bias
    4. Schematic Symbols
    5. Load Line Analysis
    6. I-V Curve
    7. Schockley Diode Equation
    8. Models
        1. Ideal
        2. Piecewise Linear
        3. Small Signal
    9. Diode Circuits
        1. Rectifier
        2. Waveshaper
        3. Clamp
        4. Logic
        5. Analog Switch
    10. Diode Types
        1. Regular
        2. Zener
        3. Schottky
6. Bipolar Junction Transistor
    1. Physics
    2. I-V Relationships
    3. NPN and PNP
    4. Schematic Symbols
    5. Regions of operation (Active, Saturation, Cutoff, and Reverse Active)
    6. Load Line Analysis
    7. Large Signal Analysis
    8. Small Signal Analysis
    9. Four Resistor Bias Network
    10. Common Emitter Amplifiers
    11. Common Base Amplifiers
    12. Voltage Regulators
    13. Resistor Transistor Logic