Homework Assignment #1   Due: Monday, Jan. 23

Chapter 1

Problems: 16, 21, 23, 28
Points: (4), (4), (6), (5)

HC.1 (4 points):
Texas Instruments markets a line of digital signal processing (DSP) chips that all have part numbers beginning with TMS320. A digital signal processing chip is a microprocessor (similar to a Pentium, for example) whose architecture is optimized to perform operations that occur frequently in DSP. DSP chips are embedded in many consumer products, such as cellular phones, smart appliances, etc. In order to use a TMS320, the chip must be connected to a power supply that provides a constant 3.3 V. The following is a schematic of this connection:
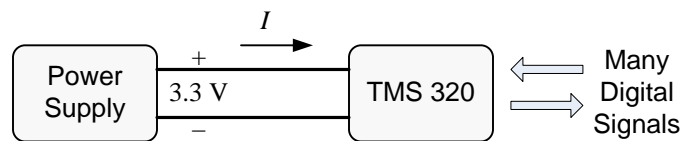
(*a*) The TMS320C6701 is a high performance chip that can perform computations at a rate of 1 GFLOPS (FLOPS stands for FLoating Point Operations per Second; typical floating point operations include multiplying or adding two numbers; 1 GFLOPS is one billion operations per second). Examples of applications where this chip would be used include signal processing for cellular telephone base stations, digital subscriber loop (DSL) modems, and image processing systems. The TMS320C6701 dissipates 1.9 W. How much current must the power supply provide to operate this chip?
(*b*) The TMS320C5402 is a low power chip with a computation rate of 100 MIPS (MIPS stands for Million Instructions Per Second). Applications for this chip include voice, video, and image processing for consumer electronics (VCRs, Video Cameras, DVD players, etc.) and smart appliances. The TMS320C5402 dissipates 58 mW. How much current must the power supply provide to operate this chip?

HJ.1 (4 points):
Use online search resources (for example, Google Scholar and Academic Search Premier) to find a technical paper from a journal or a conference which applies electrical circuit analogies to engineering problem(s) in your field (major) of study. Simply provide (*a*) a complete citation of the paper and (*b*) a printout of the paper abstract to receive full credit for this homework exercise.

Example answer for HJ.1: If your major were forestry, you might have found:
(*a*) C. A. Aumann and E. D. Ford, "Modeling tree water flow as an unsaturated flow through a porous medium," *Journal of Theoretical Biology*, vol. 219, no. 4, December 2002, pp. 415-429.
(*b*) *Abstract*: The electric circuit analogy has had a profound influence on how tree physiologists measure, model and think about tree water flow. For example, previous models that attempt to account for changes in saturation use the electric circuit analogy to define capacitance as the change in saturation per change in pressure. Given that capacitance is constant, this …