

*You will attach this as a cover sheet to your entire, stapled problem set. Please attach the questions in order. Verify the alignment of the holes for later storage in your three-ring binder.*

*Step 1 Exercises*

1. Read Chapter 1 in your textbook. Write down the objectives at the start of the chapter and attach.
2. Read Appendix E in your textbook. Make the following binary/decimal conversions:
  - a. convert the decimal number 1027 into 8-bit binary notation
  - b. convert the hexadecimal number 4E into decimal notation
  - c. make a number system with a unique base of your choice (not any of the standard 2, 10, 16 ...) and then write and solve some conversion problems between that base and decimal notation
3. A physics experiment samples voltage data at a rate of 10,000 Hz (10 kHz, or 10,000 samples per second). Each data point requires 2 bytes of storage. The highest voltage you need to read is 50 V and the lowest you need to read is -50 V.
  - a. What voltage “resolution” does your experiment allow? That is, what is the smallest difference between two voltages your experiment can distinguish? (*Hint*: calculate the number of independent data points 2 bytes can store.)
  - b. How much disk space is required to store 24 hours of data of this kind?
4. How many standard music CDs would be required to store 2 hours of stereo music sampled at 88 kHz and 32-bit resolution?
5. Watch “The Machine is Us/ing Us” available at [http://youtube.com/watch?v=NLIgopyXT\\_g](http://youtube.com/watch?v=NLIgopyXT_g) and write a short response to the portion of the video that begins at 4:04 s regarding “We’ll need to rethink a few things...” Your response can be to any of those things that need rethinking: what has changed with Web 2.0?
6. Memorize these six basic components of basic computer programming:
  - assignment of information to and from computer memory (“store this number X at memory location Y so I can use it later”)
  - input from and output to a user (keyboard, mouse, monitor, printer, ...)
  - looping (“repeat the following instructions many times”)
  - conditional branching (“if this is true, do this; otherwise, do something else”)
  - simple logic evaluations (“if this OR this is true, do this; ... if this AND this are true, do this ... “)
  - subroutines, abstraction, and encapsulation (“certain things my program does over and over again should be separate from the rest of the program so I can refer to it many times”)

For each, write down an example or metaphor from everyday life that will help you remember. For instance, assignment to and from memory is much like writing down your shopping list on a piece of paper.

Optional Step 2 Exercise

7. Work the ALSI project available from the course weblog. Attach your work to this problem set.