Homework Chapters 1-2 (21 points)
Due: Monday, February 5th, in class

1. Section 1.2 in zyBook discusses several historical figures in computer science. Here are four other important people in computer science. Read about them online, and then write a short paragraph on each (3-5 sentences) that describes what they have done for the computing revolution. The paragraph should be in your OWN words.
   a. Alan Kay
   b. Barbara Liskov
   c. Tim Berners-Lee
   d. Roberta Williams

2. Figure 1.4.4 in zyBook provides pictures of several places where embedded devices reside. Provide three other examples where embedded devices exist.

3. Perform the following conversions (easiest to go through binary for c and d!):
   a. Convert the hex number B64E to binary
   b. Convert the octal number 571 to binary
   c. Convert the hex number 9CD to octal
   d. Cover the octal number 765 to hex

4. In hexadecimal, why do you suppose we use the symbols 0-9 and A-F instead of using the numbers 1-16?

5. Perform the following conversions, assuming 16 bits are available to store the number, which is half-precision binary floating point with bias of 5 bits (or 15):
   a. Convert 0 01101 0000000000 to decimal
   b. Convert -52.5 to binary

6. Perform the following conversions, assuming 8 bits for the representation:
   a. Convert -113 to binary using sign magnitude notation
   b. Convert -113 to binary using two's complement notation

7. What is the decimal value of 11111111 if
   a. The value is in sign magnitude notation?
   b. The value is in two's complement notation?

8. What is the range of values that can be represented if 5 bits are available for representation:
   a. sign magnitude notation
   b. two's complement notation

9. Perform the following binary arithmetic operations, assume we are using 2’s complement representation. Leave your answer in binary and list any concerns.
   a. 000101 + 011011:
   b. 101110 + 010101:

10. Using the ASCII code set,
    a. show the internal binary representation for the following character string (note space): Am I
    b. What character does 110 1101 represent?

11. True or False: A digital audio sample can be converted back to the EXACT analog sound wave it was created from. Explain.
12. How many bytes does it take to store 10 seconds of video, if the video is 24 frames per second and each frame is 640x480 pixels? Show your work.

13. Vacuum tubes are better than relays. Why? Transistors are better than vacuum tubes. Why?

14. Assume that a=5, b=6, and c=9. What is the result of each of the following Boolean expressions?
   a. \((a + b) > c\) AND \((b < c)\)
   b. \(\text{NOT} [(a == b) OR (b == c)]\)

15. Provide a truth table for 3-input AND, 3-input OR, 2-input NAND, and 2-input NOR.

16. Given the following circuit diagram, what is the value output when input \(A = 1, B = 1, C = 0, D = 0, E = 0\)?

![Circuit Diagram]

17. Using the sum-of-products algorithm discussed in class, translate the following truth table (3 inputs and 1 output) into a circuit diagram. Provide the Boolean expression for the circuit.

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<thead>
<tr>
<th>Inputs</th>
<th>Output</th>
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<td>A</td>
<td>B</td>
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<td>0</td>
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