

Assignment 2
(Due date: 9/23/2009, Wednesday, in class)

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|------------|--------|
| Your name: | Grade: |
|------------|--------|

Important notice on how to submit and grade this assignment:

- Write your answers on **different papers** from the question sheets; otherwise, they will **NOT** be graded.
- You do **NOT** have to write the question text, but you need to **write the question number** for each question.
- Put your solutions in the **same order** as the questions appear on the assignment; otherwise, **missed or misplaced** solutions will **NOT** be graded.
- **How to Grade:**
 - The total score for the assignment is **100** points.
 - **An extra 8%** will be added to the **TYPEWRITTEN** submissions.
 - **3 points will be deducted** from your total score if you **missed any ONE** of the following (this is a *cumulative penalty*, e.g., 9 points will be taken for 1 missed name and 2 missed required blank lines):
 - **Your name and assignment number** on the top of each solution sheet/paper,
 - At least **one blank line** between solutions of adjacent questions (**except for** those of *Multiple Choice* or *True/False* questions).

The following questions are taken from the textbook Chapter 3 (p. 84-89).

- ❖ **For questions 21 through 26, using A, B, C, D, E, or F as your answers** for each of these questions (you may write text solutions alongside these A, B, ...F). **50%** will be deducted if your solutions are **NOT** one of these A, B, ...F (even though your texts give the correct answers).
- ❖ Do **NOT** use any calculators for the conversion/calculation questions.

- For Exercises 21-26, match the solution (**A, B, C, D, E, or F**) with the problem:

- A. Signed-magnitude representation
- B. Radix
- C. Frequency of use
- D. Sampling
- E. Analog
- F. Digital

21. _____ data is a continuous representation of information.

22. The representation for numbers you've used since grade school is called _____.

23. If the number base is other than base 10, we call the decimal point the _____.
24. _____ data is a discrete representation of information.
25. Huffman codes are created based on the _____ of the character.
26. An audio signal is digitized by _____ its value at regular intervals.
- 33. How many things can be represented with
 - a. four bits
 - b. five bits
 - c. six bits
 - d. seven bits

 - 36. Given a fixed-sized number scheme where k in the formula for the ten's complement is 6 (see page 61 of textbook, or slide 20 of chapter slides on the web), answer the following questions.
 - a. How many positive integers can be represented?
 - b. How many negative integers can be represented?
 - c. Draw the number line showing the three smallest and largest positive numbers, the three smallest and largest negative numbers, and zero.

 - 38. Use the formula for the ten's complement to calculate the following numbers in the scheme described on page 61.
 - a. 35768
 - b. -35768
 - c. -444455
 - d. -123456

 - 44. Convert the following real (decimal) numbers to binary (five binary places).
 - a. 0.50
 - b. 0.25
 - c. 0.10 (**Bonus: 3 points**)

 - 47. How many bits would be needed to represent a character set containing 45 characters? Why?

 - 49. What is the main difference between the ASCII and Unicode character sets?

500. Complete the following table

| Decimal numbers (given) | Signed binary numbers (6 bits) | 2's complement numbers (6 bits) |
|-------------------------|--------------------------------|---------------------------------|
| -31 | | |
| -14 | | |
| -8 | | |
| -7 | | |
| -1 | | |
| 0 | | |
| 1 | | |
| 4 | | |
| 8 | | |
| 9 | | |
| 24 | | |
| 31 | | |

501. The following messages are represented in ASCII. What do they say?

- 57 68 61 74 3F (in Hex)
- 062 060 060 101 (in Oct)

502. How many bytes of storage space would be required to store a 400-page novel in which each page contains 3500 characters if ASCII were used? How many bytes would be required if Unicode were used? (results should be represented in *nnnKB* or *nnnMB*, calculators can be used for this question)