CSE 1010 Ideas and Impact of Computing
Homework 1
Due 11am, Fri, Sep 19, 2014
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1. Discuss the main problem/task that motivated the design and development of:

   (a) Difference Engine

   (b) ENIAC

2. Discuss the key design difference between ENIAC and UNIVAC and the advantage of the new design?

3. Discuss one advantage and one disadvantage of packet switching over circuit switching.

4. Discuss the key advantage of using Interface Message Processors (IMP) in a computer network.

5. Discuss two issues in designing Interface Message Processors.

6. Show your steps in converting 123 (decimal) to binary, octal, and hexadecimal.

7. Show your steps in converting 11100111 (binary) to decimal, octal, and hexadecimal.

8. Show your steps in converting 12.345 (decimal) to binary, octal, and hexadecimal. Precision up to 3 places after the dot.

9. Show your steps in converting 10.0101 (binary) to decimal, octal, and hexadecimal. Precision up to 3 places after the dot.

10. For the following truth table with a and b as input and p, q, r and s as output:

a	b	p	q	r	s
0	0	0	0	0	1
0	1	0	1	1	1
1	0	1	1	1	1
1	1	0	0	1	1

    (a) convert the table into Karnaugh Maps,

    (b) find the minimal Boolean expressions ("equations"), and

    (c) design the circuit.

11. Consider adding two 2-bit binary numbers:

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      a b
 +    d e
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    c s t
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    (a) design the truth table,

    (b) convert the table into Karnaugh Maps, and

    (c) find the minimal Boolean expressions for c, s, and t.

12. Given 4 bits, show your steps in:

    (a) converting -7 (decimal) to its two's complement in binary,

    (b) converting -3 (decimal) to its two's complement in binary, and

    (c) adding the two binary numbers (anything strange?).

13. Given n bits, derive the range of integers in two's complement.

14. Given 10 bits, 1 for sign, 5 for mantissa, and 4 for exponent (in two's complement), show your steps in converting 1.375 (decimal) to a floating-point number (binary).