CSE20 Exercise 1, January 26, 2010, Name_____

1. Convert 234_{16} to binary.
2. Convert a binary number (110101) to a decimal number.
3. A hybrid system has 5 digits of radix 3 and 4 digits of radix 4. Describe the range of the system.
4. Write the truth table of a full subtracter with three binary inputs x, y, b_{in} and two binary outputs b_{out}, d.
5. Write the sequence of a 3-bit Gray code.
6. Describe the ranges of the signed magnitude representation, one's complement representation, and two's complement representation for 8-bit system.
7. Convert 66_{10} to the 8-bit two's complement representation.
8. Given $x = 12_{10}$ and $y = 14_{10}$, show the operation of $x - y$ with 6-bit one's complement.
9. We have defined and learned the idea of two's complement for n-bit binary numbers. Given an n-digit system with base 8, define the eight's complement representation. Show the arithmetic of $x - y$ where $x = 11_8$ and $y = 15_8$ with a 5-digit system in eigth's complement representation.
10. Prove that $\frac{1}{1\times3} + \frac{1}{3\times5} + ... + \frac{1}{(2n-1)(2n+1)} = \frac{n}{2n+1}$
11. Given three integers x, y, d, prove that $(x+y)\%d = (x\%d + y\%d)\%d$, where % is a modulus operation.
12. Given three integers x, y, d, prove that $(x-y)\%d = (x\%d - y\%d)\%d$, where % is a modulus operation.
13. Given three integers x, y, d, prove that $(x\%d \times y\%d)\%d = (x \times y)\%d$, where % is a modulus operation.