Fall 2003 **CMSC 311: Homework 1** Kruskal and Scolnik

Due at the start of class Wednesday, September 17, 2003.

Show your work on Problems 1 to 12.

Problem 1. Convert 245_7 to a base 10 number.

Problem 2. Convert 245_{10} to a base 7 number.

Problem 3. Convert 324_6 to a base 4 number.

Problem 4. Convert 100011101_2 to octal.

Problem 5. Convert 11010001101001_2 to hexadecimal.

Problem 6. Convert 3720623_8 to hexadecimal.

Problem 7. Add $\mathrm{B13A9E4CA}_{16} + \mathrm{8DB9FC5A2}_{16}$.

Problem 8. Subtract $\mathrm{B13A9E4CA}_{16} - \mathrm{8DB9FC5A2}_{16}$.

Problem 9. Convert 11.101_2 to decimal notation.

Problem 10. Convert $1.101101101\overline{101}_2$ to decimal notation.

Problem 11. Convert 0.45_{10} to binary notation (with a binary point).

Problem 12. Convert $0.16666\overline{6}_{10}$ to binary notation (with a binary point).

Problem 13.

(a) Show that if the sum of the digits of a number (in base 10) is divisible by 9 then the original number is also divisible by 9. HINT: Use mod 9.

(b) Show that if the sum of the digits of a number in base 8 is divisible by 7 then the original number is also divisible by 7.

Problem 14.

(a) Based on the results in Problem (13), state a rule for a hexadecimal number to be divisible by 15. No proof necessary.

(b) Using the rule, is $\mathrm{B13A9E4CA}_{16}$ divisble by 15? Show your work.

(c) Using the rule, is $\mathrm{8DB9FC5A2}_{16}$ divisble by 15? Show your work.

(d) Is the sum of the two values in Parts (b) and (c) divisble by 15? Why?