

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  $B13A9E4CA_{16} + 8DB9FC5A2_{16}$ .

**Problem 8.** Subtract  $B13A9E4CA_{16} - 8DB9FC5A2_{16}$ .

**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  $0.1666\overline{6}_{10}$  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  $B13A9E4CA_{16}$  divisible by 15? Show your work.
- (c) Using the rule, is  $8DB9FC5A2_{16}$  divisible by 15? Show your work.
- (d) Is the sum of the two values in Parts (b) and (c) divisible by 15? Why?