MATH 2610
Discrete Mathematics for Computer Science
Wednesday March, 2 2005

(1) Convert these integers from hexadecimal notation to binary notation.
  (a) 80E
  (b) 135AB
  (c) ABBA
  (d) DEFACED
  (e) BADFACED
(2) Find the following sums in the indicated base without converting to decimal.
  (a) $1011 + 1111$ base 2 (binary).
  (b) $2120 + 1102$ base 3 (ternary).
  (c) $7210 + 6566$ base 8 (octal).
  (d) $A103 + BAD1$ base 16 (hexadecimal).
(3) Find the following products in the indicated base without converting to decimal.
  (a) $1011 \cdot 1111$ base 2 (binary).
  (b) $2120 \cdot 1102$ base 3 (ternary).
  (c) $7210 \cdot 6566$ base 8 (octal).
  (d) $A103 \cdot BAD1$ base 16 (hexadecimal).
(4) Use the Euclidean algorithm to find
  (a) $\gcd(1, 5)$.
  (b) $\gcd(100, 101)$.
  (c) $\gcd(123, 277)$.
  (d) $\gcd(1529, 14039)$.
  (e) $\gcd(1529, 14038)$.
  (f) $\gcd(11111, 111111)$.
(5) Show tat 15 is an inverse of 7 modulo 26.
(6) Show that 937 is an inverse of 13 modulo 2436.
(7) Find an inverse of 4 modulo 9.
(8) Find an inverse of 2 modulo 17.
(9) Find an inverse of 19 modulo 141.
(10) Find an inverse of 144 modulo 233.
(11) Solve the congruence $4x \equiv 5 (\text{mod } 9)$.
(12) Solve the congruence $2x \equiv 7 (\text{mod } 17)$.
(13) Show that an inverse of a modulo m does not exist if $\gcd(a, m) > 1$.