Siena College's 32nd Annual High School Programming Contest
Sponsored by Transfinder
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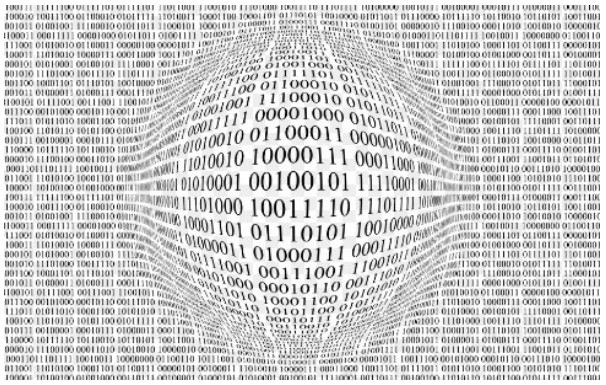
Gold Problem #3: A Quick Change (of Base)

Background Information: All computer scientists know how crucial binary (base 2) numbers and positional notation in general are for designing and implementing computer architectures.
For positional notation in base 10 the integer 234 = 2*100 + 3*10 + 4*1 = $2*10^2 + 3*10^1 + 4*10^0$. The position of the "2" means that it represents 200.
For positional notation in base 2 the integer 11001 = $1*2^4 + 1*2^3 + 0*2^2 + 0*2^1 + 1*2^0$. This is equal to 25 in base 10
There is a nice algorithm for converting a base 10 number to its equivalent in other bases. The algorithm uses repeated division by B (the base) until reaching a quotient of 0. The remainders from the division are used to build the equivalent representation of the number in base B. Here is the sequence of divisions for converting 77 base 10 to 1001101 base B = 2.



77 / 2 = 38 with a remainder of **1**

38 / 2 = 19 with a remainder of **0**

19 / 2 = 9 with a remainder of **1**

9 / 2 = 4 with a remainder of **1**

4 / 2 = 2 with a remainder of **0**

2 / 2 = 1 with a remainder of **0** and

1 / 2 = 0 with a remainder of **1**.

The remainders can be used (from bottom up) to build the binary equivalent of the starting base 10 value.

A number base B between 2 and 10 uses the first B non-negative digits found in base ten (0..9). For example, base 2 uses 0 and 1. For bases greater than 10, the digits 0..9 are used with uppercase letters starting with A. For example, base 12 uses 0., 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, and C.
Base 16 uses 0..9 and A..F.
When converting 10815 base 10 to base 16 the sequence of remainders will be 15, 3, 10 and 2 therefore, $10815_{10} = 2A3F_{16}$.

Programming Problem:

Input:	Positive integer N, with N < 1,000,000 followed by a base B between 2 and 16. There will be a single space separating N and B.
Output:	The list of quotients and remainders from the number base conversion algorithm described above with one pair per line followed by the final binary value for N.

Example 1:	Input	77 2	Example 2:	Input:	10815 16
	Output:	38 1		Output:	675 15
		19 0			42 3
		9 1			2 10
		4 1			0 2
		2 0			2A3F
		1 0			
		0 1			