## Base Notation

## Background

Base-10 or the decimal number system is a frequently used notation for writing numbers. Base10 makes use of the symbols (digits) $\{0,1,2,3,4,5,6,7,8,9\}$. On the other hand, computers use of the binary number system or base-2 to represent numbers. The symbols $\{0,1\}$ are the only digits used in base-2. More generally, a number in base- $n$ uses the first $n$ symbols in the sequence ( $0,1,2, \ldots, 9$, A, B, C, $\ldots$, Z). For example, base-16 uses the symbols ( $0,1,2, \ldots, 9$, A, B, C, D, E, F) where A represents the value 10, B represents 11, and so on.

## Problem Statement

Given integer $\boldsymbol{D}\left(0 \leq \boldsymbol{D}<10^{12}\right)$ and integer $\boldsymbol{b}(16 \geq \boldsymbol{b}>1)$, write a program to compute the following:

- base-b representation of $\boldsymbol{D}$.
- whether or not the base-b representation of $\boldsymbol{D}$ is a palindrome*.

The integers read from standard input are in base-10 notation.
*A palindrome is a sequence of characters that reads the same when starting from either the first or last character. For example:
madam, BOB, 12121 are palindromes.

## Sample Program Operation

User input is colored green.

## Sample Instance 1

```
Enter a non-negative decimal Integer : 111
Convert to Base ? 11
Base-11 representation of 111 : A1
A1 is not a palindrome.
```


## Sample Instance 2

```
Enter a non-negative decimal Integer : 15
Convert to Base ? 16
Base-16 representation of 15 : F
F is a palindrome.
```


## Grading Criteria

- The program compiles. If the program does not compile no further grading can be accomplished.

Programs that do not compile will receive a zero.

- (15 Points) The program executes without exception and produces output. The grading of the output cannot be accomplished unless the program executes.
- (30 Points) Correct conversion to user specified base.
- (30 Points) Correct identification of palindromes.
- (5 Points) The program is documented (commented) properly.
- (5 Points) Proper indentation.
- (5 Points) Descriptive and consistent naming standards followed.
- (10 Points) Variable declarations
- Variables' scope is reasonably constrained (e.g., your program should not have global variables)
- Type of variables (e.g., use constant when value of variable should not change)


## Concepts Tested

Arithmetic, Strings, Comparison, Loops, etc.

