CITC-1301 Introduction to Programming

Chapter 5 Lab 2 – Decimal to Base$_2$ through Base$_{16}$ Converter

A decimal number (i.e., base$_{10}$ number) can be converted to another numbering system (base) using the "Remainder" Conversion Method.

Write a Python program to convert decimal numbers to other numbering systems. Create a function called **`convertDecimalTo()`** that implements the "Remainder" Conversion Method as presented below.

The **`convertDecimalTo()`** function accepts two arguments: **`number`** and **`base`**. The **`number`** parameter holds the number to be converted; the **`base`** parameter holds the base to which the number is to be converted. The **`convertToDecimal()`** function returns the conversion as a string.

```
LET result be an empty string
LET number be the decimal number to convert
LET base be the base to convert to

REPEAT while number is greater than zero
        LET remainder be the remainder of the number divided by the base

        IF remainder is less than 10 THEN
                Convert remainder to a string and add it to the beginning of result
        ELSE
                Based on remainder add the appropriate letter to the beginning of result
        END IF

        LET number be number integer-divided by base
END REPEAT

OUTPUT result
```

Other design requirements

- The program's main logic should be placed in a the **`main()`**. At the end of the code, call the **`main()`** function.
- Validate user input against values less than zero. Be sure to inform the user how to correct their mistake.
- Use a **`for`** loop to iterate from base$_2$ through base$_{16}$ to output the base conversions.

Example output:

```
Decimal to Base 2-16 Converter

Enter a number to convert: -5 [ENTER]
Please enter a positive whole number.
Enter a number to convert: 42 [ENTER]

Base 2: 101010
Base 3: 1120
Base 4: 222
Base 5: 132
Base 6: 110
Base 7: 60
Base 8: 52
Base 9: 46
Base 10: 42
Base 11: 39
Base 12: 36
Base 13: 33
Base 14: 30
Base 15: 2C
Base 16: 2A
```

Digit availability

Base	Digits														
	0	1	2	3	4	5	6	7	8	9	A (10)	B (11)	C (12)	D (13)	E (14)	F (15)
Base 2	0	1														
Base 3	0	1	2													
Base 4	0	1	2	3												
Base 5	0	1	2	3	4											
Base 6	0	1	2	3	4	5										
Base 7	0	1	2	3	4	5	6									
Base 8	0	1	2	3	4	5	6	7								
Base 9	0	1	2	3	4	5	6	7	8							
Base 10	0	1	2	3	4	5	6	7	8	9						
Base 11	0	1	2	3	4	5	6	7	8	9	A					
Base 12	0	1	2	3	4	5	6	7	8	9	A	B				
Base 13	0	1	2	3	4	5	6	7	8	9	A	B	C			
Base 14	0	1	2	3	4	5	6	7	8	9	A	B	C	D		
Base 15	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	
Base 16	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Conversion examples

Base	Decimals							
	10	50	75	100	150	200	250	255
Base 2	1010	110010	1001011	1100100	10010110	11001000	11111010	11111111
Base 3	101	1212	2210	10201	12120	21102	100021	100110
Base 4	22	302	1023	1210	2112	3020	3322	3333
Base 5	20	200	300	400	1100	1300	2000	2010
Base 6	14	122	203	244	410	532	1054	1103
Base 7	13	101	135	202	303	404	505	513
Base 8	12	62	113	144	226	310	372	377
Base 9	11	55	83	121	176	242	307	313
Base 10	10	50	75	100	150	200	250	255
Base 11	A	46	69	91	127	172	208	212
Base 12	A	42	63	84	106	148	18A	193
Base 13	A	3B	5A	79	B7	125	163	168
Base 14	A	38	55	72	AA	104	13C	143
Base 15	A	35	50	6A	A0	D5	11A	120
Base 16	A	32	4B	64	96	C8	FA	FF

Submission Instructions

- Upload your Python script (i.e., your .py file) to the appropriate dropbox on eLearn.