Python – Number Systems

Purpose

This lab was designed to teach you how to use iteration, introduce you to different number systems and to review formatting.

Description

Write a program that prompts the user for a range of numbers then print each number in binary, octal, hexadecimal and its character value. Below is a chart for the types that will be useful with string.format(). Recall "{0:20d}".format(65) uses the 0th argument, width of 20 and type decimal integer. By default, numbers are right aligned (> not needed - {0:>20d}).

Type	Meaning
'b'	Binary format. Outputs the number in base 2.
'c'	Character. Converts the integer to the corresponding Unicode character before printing.
'd'	Decimal Integer. Outputs the number in base 10.
'o'	Octal format. Outputs the number in base 8.
'x'	Hex format using lower-case letters.
'X'	Hex format using upper-case letters.

Alternatively, python has a bin(), oct(), hex() and chr() functions that take an integer and returns a string. The string returned by bin(), oct() and hex() are prefaced with '0b', '0o' and '0x' respectively. Therefore, bin(65) returns '0b1000001'. Try these out in IDLE.

Program Shell

Create a file named number_systems.py

Sample Execution

```
Enter start (or q to quit): 48
Enter end: 57
  Decimal      Binary      Octal        Hex        ASCII
         48      110000         60         30            0
         49      110001         61         31            1
         50      110010         62         32            2
         51      110011         63         33            3
         52      110100         64         34            4
         53      110101         65         35            5
         54      110110         66         36            6
         55      110111         67         37            7
         56      111000         70         38            8
         57      111001         71         39            9
```

```
Enter start (or q to quit): 65
Enter end: 90
  Decimal      Binary      Octal        Hex        ASCII
          65     1000001         101          41           A
          66     1000010         102          42           B
          67     1000011         103          43           C
          68     1000100         104          44           D
          69     1000101         105          45           E
          70     1000110         106          46           F
          71     1000111         107          47           G
          72     1001000         110          48           H
          73     1001001         111          49           I
          74     1001010         112          4a           J
          75     1001011         113          4b           K
          76     1001100         114          4c           L
          77     1001101         115          4d           M
          78     1001110         116          4e           N
          79     1001111         117          4f           O
          80     1010000         120          50           P
          81     1010001         121          51           Q
          82     1010010         122          52           R
          83     1010011         123          53           S
          84     1010100         124          54           T
          85     1010101         125          55           U
          86     1010110         126          56           V
          87     1010111         127          57           W
          88     1011000         130          58           X
          89     1011001         131          59           Y
          90     1011010         132          5a           Z

Enter start (or q to quit): 122
Enter end: 97
  Decimal      Binary      Octal        Hex        ASCII
         122     1111010         172          7a           z
         121     1111001         171          79           y
         120     1111000         170          78           x
         119     1110111         167          77           w
         118     1110110         166          76           v
         117     1110101         165          75           u
         116     1110100         164          74           t
         115     1110011         163          73           s
         114     1110010         162          72           r
         113     1110001         161          71           q
         112     1110000         160          70           p
         111     1101111         157          6f           o
         110     1101110         156          6e           n
         109     1101101         155          6d           m
         108     1101100         154          6c           l
         107     1101011         153          6b           k
         106     1101010         152          6a           j
         105     1101001         151          69           i
         104     1101000         150          68           h
         103     1100111         147          67           g
         102     1100110         146          66           f
         101     1100101         145          65           e
         100     1100100         144          64           d
          99     1100011         143          63           c
          98     1100010         142          62           b
          97     1100001         141          61           a

Enter start (or q to quit): q
```