**Module B.7 Coding & Decoding**

**Level 1: Basic ASCII Coding**

1. Research the "ASCII Code"

a. Explain what ASCII stands for.

ASCII is abbreviated from American Standard Code for Information Interchange.

b. Explain how to convert a letter into an ASCII coded number

You’d simply look at the ASCII code chart, look for the letter you want to decode and depending on your option of encryption (Decimal, Octal, Hexadecimal, etc.), your chosen letter will be encoded.

c. Explain how to decode an ASCII number into a letter

You’d simply look at the ASCII code chart, look for the ASCII number you want to decode and see what it translates to in English

2. Open a new Python Repl and run the sample program provided at the end of this module.

a. Briefly summarize what the "ascii Codes" list does

If asciiCodes = 65, the output is an uppercase “A”. If asciiCodes = 66, the output is an uppercase “B” and so on all the way to “D”. If asciiCodes += (greater than or equal to) [("a",97), ("b",98), ("c",99), ("d",100)], the output is the lowercase variants of their uppercase counterparts.

b. Briefly summarize what the "textCoder" function does

This function codes the specified textChar into a three digit number padded with zeros.

c. Briefly summarize what the "textDeCoder" function does

It takes the numbers and decodes them into separate letters of the English alphabet.

d. Briefly summarize what the main program code does

print("char: ",textChar," ASCII Coded char: ", codedChar)

3. Explain the main limitation of the program.

It’s currently limited to converting only the characters "ABCD" and "abcd".

**Level 2: Extending The Program**

1. Modify the sample program to do the following (Still using the ASCII code):

a. Code all of the uppercase and lowercase letters

asciiCodes = ("A",65),("B",66),("C",67),("D",68),("E",69),("F",70),("G",71),("H",72),("I",73),("J",74),("K",75),("L",76),("M",77),("N",78),("O",79),

("P",80),("Q",81),("R",82),("S",83),("T",84),("U",85),("V",86),("W",87),

("X",88),("Y",89),("Z",90)]

asciiCodes += [("a",97),("b",98),("c",99),("d",100),("e",101),("f",102),

("g",103),("h",104),("i",105),("j",106),("k",107),("l",108),("m",109),

("n",110),("o",111),("p",112),("q",113),("r",114),("s",115),("t",116),

("u",117),("v",118),("w",119),("x",120),("y",121),("z",123)]

b. Code the digits 0 to 9

("0",48),("1",49),("2",50),("3",51),("4",52),("5",53),("6",54),("7",55),("8",56),("9",57),("10",58)

c. Code at least 5 special characters (e.g. "1?$%&")

(" ",32),("!",33),('"',34),("#",35),("-",45)

2. Verify that your program works for ***coding*** a message containing all of the basic and special characters.

a. Provide a sample of your program output below.

3. Verify that your program works for ***decoding*** a message containing all of the basic and special characters.

a. Provide a sample of your program output below.

The quick brown fox #123,456,789, jumps over the lazy dog "THE QUICK BROWN FOX #123,456,789, JUMPS OVER-THE LAZY DOG!"

Coded string is: 084 104 101 032 113 117 105 099 107 032 098 114 111 119 110 032 102 111 120 032 035 049 050 051 044 052 053 054 044 055 056 057 044 032 106 117 109 112 115 032 111 118 101 114 032 116 104 101 032 108 097 123 121 032 100 111 103 032 034 084 072 069 032 081 085 073 067 075 032 066 082 079 087 078 032 070 079 088 032 035 049 050 051 044 052 053 054 044 055 056 057 044 032 074 085 077 080 083 032 079 086 069 082 045 084 072 069 032 076 065 090 089 032 068 079 071 033 034 032.

4. List your program modifications below:

asciiCodes = [(" ",32),("!",33),('"',34),("#",35),(",",44),("-",45),("0",48),("1",49),("2",50),("3",51),("4",52),("5",53),("6",54),("7",55),("8",56),("9",57),("10",58),("A",65),("B",66),("C",67),("D",68),("E",69),("F",70),("G",71),("H",72),("I",73),("J",74),("K",75),("L",76),("M",77),("N",78),("O",79),("P",80),("Q",81),("R",82),("S",83),("T",84),("U",85),("V",86),("W",87),("X",88),("Y",89),

("Z",90)]

asciiCodes += [("a",97),("b",98),("c",99),("d",100),("e",101),("f",102),

("g",103),("h",104),("i",105),("j",106),("k",107),("l",108),("m",109),

("n",110),("o",111),("p",112),("q",113),("r",114),("s",115),("t",116),

("u",117),("v",118),("w",119),("x",120),("y",121),("z",123)]

**Level 3: Creating A Secret Code**

1. Modify the sample program to create your own secret code that is different from the ASCII code:

a. Work with a partner to create a secret code that codes letters and characters into different letters and characters.

b. Your program should be able to create a coded message that

you can give to your partner

c. Your program should be able to decode a coded message that

you get from your partner

2. Provide a sample of your program output below.

a. Show how your program codes a secret message

def textCoder(textChar) :

for textCode in asciiCodes :

if (textCode[0] == textChar) :

return format(textCode[1],'03')

return "000"

b. Show how your program de-codes a secret message

def textDeCoder (codedChar) :

if (codedChar == "") or (codedChar == "000") :

return " "

for textCode in asciiCodes :

if (textCode[1] == int(codedChar)) :

return textCode[0]

return " "

3. List your program modifications below:

asciiCodes = [(" ",90),("!",89),('"',88),("#",87),(",",86),("-",85),("0",84),("1",83),("2",82),("3",81),("4",80),("5",79),("6",78),("7",77),("8",76),

("9",76),("10",75),("A",74),("B",73),("C",72),("D",71),("E",70),("F",69),

("G",68),("H",67),("I",66),("J",65),("K",64),("L",63),("M",62),("N",61),

("O",60),("P",59),("Q",58),("R",57),("S",56),("T",55),("U",54),("V",53),

("W",52),("X",51),("Y",50),("Z",49)]

asciiCodes += [("a",124),("b",125),("c",126),("d",127),("e",128),("f",129),

("g",130),("h",142),("i",155),("j",164),("k",175),("l",188),("m",194),

("n",200),("o",210),("p",225),("q",240),("r",250),("s",265),("t",266),

("u",277),("v",289),("w",365),("x",555),("y",765),("z",777)]

**Appendix: Sample Program**

"""

This program is currently limited to converting only the

characters "ABCD" and "abcd". The "ascii Codes" list can be easily

extended to include more letters and special characters.

This program currently uses the ASCII codes for converting text.

You can easily create your own secret code by changing the numbers

in the "asciiCodes" list.

"""

asciiCodes = [("A",65),("B",66),("C",67),("D",68)]

asciiCodes += [("a",97),("b",98),("c",99),("d",100)]

# This function codes the specified textChar into a

# three digit number padded with zeroes

def textCoder(textChar) :

for textCode in asciiCodes :

if (textCode[0] == textChar) :

return format(textCode[1],'03')

return "000"

def textDeCoder (codedChar) :

if (codedChar == "") or (codedChar == "000") :

return " "

for textCode in asciiCodes :

if (textCode[1] == int(codedChar)) :

return textCode[0]

return " "

# MAIN PROGRAM CODE STARTS HERE

print("Enter a password to code.")

textIn = input("password: ")

codeOut = ""

for textChar in textIn :

codedChar = textCoder(textChar)

codeOut = codeOut + codedChar + " "

#print("char: ",textChar," ASCII Coded char: ", codedChar)

print("Coded string is: ",codeOut)

print(" ")

print("Enter a coded password to decode")

print("(or return to use the Coded string)")

codeIn = input("Code: ")

if codeIn == "" :

codeIn = codeOut

codeList = codeIn.split(" ")

textOut = ""

for codedChar in codeList :

if (codedChar != "") :

textChar = textDeCoder(codedChar)

textOut += textChar

#print("ASCII Coded char: ", codedChar," decoded char: ",textChar)

print("DeCoded string is: ",textOut)