**Part 1 - Algorithm Pseudocode**

**// Directions**

Write an algorithm (pseudocode) to do the following conversions. The system should take in as input a number from one number system and convert it to another number system. The converted number should be displayed as output. The pseudocode you write should be in format that is easy to read and understand.

1. Decimal to Binary

2. Binary to Decimal

3. Decimal to Hexadecimal

4. Hexadecimal to Decimal

5. Hexadecimal to Binary

6. Binary to Hexadecimal

**// Converting Decimal to Binary**

FUNC dec\_to\_bin(decNum)

binNum = ""

WHILE decNum > 0

**// Get remainder using MOD 2**

remainder = decNum % 2

**// Concatenate to left**

binNum = remainder + binNum

**// Update decNum**

decNum = decNum / 2

END WHILE

RETURN binNum

END FUNC

**// Converting Binary to Decimal**

FUNC bin\_to\_dec(binNum)

decNum = 0

binLength = LENGTH(binNum)

FOR i FROM 1 TO binLength

**// Get single bit**

bit = SUBSTRING(binNumber, binLength - i + 1, 1)

**// Power of 2 increases by i (i = bit position)**

decNum = decNum + (bit \* (2^(i-1)))

END FOR

RETURN decNum

END FUNC

**// Converting Decimal to Hexadecimal**

FUNC dec\_to\_hex(decNum)

hexNum = ""

hexDigits = "0123456789ABCDEF"

WHILE decNum > 0

**// Get remainder using MOD 16**

remainder = decNum % 16

**// Concatenate to left**

hexNum = hexDigits[remainder + 1] + hexNum

**// Update decNum**

decNum = decNum / 16

END WHILE

RETURN hexNum

END FUNC

**// Converting Hexadecimal to Decimal**

FUNC hex\_to\_dec(hexNum)

decNum = 0

hexLength = LENGTH(hexNum)

hexDigits = "0123456789ABCDEF"

FOR i FROM 1 TO hexLength

**// Finds index of digit in hexDigits for dec value**

digit = INDEX\_OF(hexDigits, SUBSTRING(hexNum, hexLength - i + 1, 1))

**// Get dec value**

decNum = decNum + (digit \* (16^(i-1)))

END FOR

RETURN decNum

END FUNC

**// Converting Hexadecimal to Binary**

FUNC hex\_to\_bin(hexNum)

**// Utilizes previous FUNCs**

decEquivalent = hex\_to\_dec(hexNum)

binNum = dec\_to\_bin(decEquivalent)

RETURN binNum

END FUNC

**// Converting Binary to Hexadecimal**

FUNC bin\_to\_hex(binNum)

**// Utilizes previous FUNCs**

decEquivalent = bin\_to\_dec(binNum)

hexNum = dec\_to\_hex(decEquivalent)

RETURN hexNum

END FUNC

**// Example Usage**

binaryResult = decimalToBinary(42)

decimalResult = binaryToDecimal("101010")

hexResult = decimalToHexadecimal(255)

decimalResult = hexadecimalToDecimal("1FF")

binaryResult = hexadecimalToBinary("1A")

hexResult = binaryToHexadecimal("1101")