



# Introduction to Numbers

Numbers? What.

Alexander Wang [alwang@student.42.us.org](mailto:alwang@student.42.us.org)  
42 Staff [pedago@42.fr](mailto:pedago@42.fr)

*Summary: In this project you will be learning about binary numbers and hexadecimal as well as how to convert between them as well as other bases.*

# Contents

<b>I</b>	<b>Foreword</b>	<b>2</b>
<b>II</b>	<b>Introduction</b>	<b>7</b>
<b>III</b>	<b>Goals</b>	<b>8</b>
<b>IV</b>	<b>Mandatory part</b>	<b>9</b>
<b>V</b>	<b>Exercise 00: Base-10 to Binary</b>	<b>10</b>
<b>VI</b>	<b>Exercise 01: Binary to Base-10</b>	<b>11</b>
<b>VII</b>	<b>Exercise 02: Binary to Hexadecimal</b>	<b>12</b>
<b>VIII</b>	<b>Exercise 03: Bin to Hex Part 2</b>	<b>13</b>
<b>IX</b>	<b>Exercise 04: Math Without Operators</b>	<b>14</b>
<b>X</b>	<b>Exercise 05: Logical Operators</b>	<b>15</b>
<b>XI</b>	<b>Bonus part</b>	<b>16</b>
<b>XII</b>	<b>Turn-in and peer-evaluation</b>	<b>17</b>

# Chapter I

## Foreword

99 bottles of beer on the wall, 99 bottles of beer.

Take one down and pass it around, 98 bottles of beer on the wall.

98 bottles of beer on the wall, 98 bottles of beer.

Take one down and pass it around, 97 bottles of beer on the wall.

97 bottles of beer on the wall, 97 bottles of beer.

Take one down and pass it around, 96 bottles of beer on the wall.

96 bottles of beer on the wall, 96 bottles of beer.

Take one down and pass it around, 95 bottles of beer on the wall.

95 bottles of beer on the wall, 95 bottles of beer.

Take one down and pass it around, 94 bottles of beer on the wall.

94 bottles of beer on the wall, 94 bottles of beer.

Take one down and pass it around, 93 bottles of beer on the wall.

93 bottles of beer on the wall, 93 bottles of beer.

Take one down and pass it around, 92 bottles of beer on the wall.

92 bottles of beer on the wall, 92 bottles of beer.

Take one down and pass it around, 91 bottles of beer on the wall.

91 bottles of beer on the wall, 91 bottles of beer.

Take one down and pass it around, 90 bottles of beer on the wall.

90 bottles of beer on the wall, 90 bottles of beer.

Take one down and pass it around, 89 bottles of beer on the wall.

89 bottles of beer on the wall, 89 bottles of beer.

Take one down and pass it around, 88 bottles of beer on the wall.

88 bottles of beer on the wall, 88 bottles of beer.

Take one down and pass it around, 87 bottles of beer on the wall.

87 bottles of beer on the wall, 87 bottles of beer.

Take one down and pass it around, 86 bottles of beer on the wall.

86 bottles of beer on the wall, 86 bottles of beer.

Take one down and pass it around, 85 bottles of beer on the wall.

85 bottles of beer on the wall, 85 bottles of beer.

Take one down and pass it around, 84 bottles of beer on the wall.

84 bottles of beer on the wall, 84 bottles of beer.

Take one down and pass it around, 83 bottles of beer on the wall.

83 bottles of beer on the wall, 83 bottles of beer.

Take one down and pass it around, 82 bottles of beer on the wall.

82 bottles of beer on the wall, 82 bottles of beer.

[illegible]

4

5

Take one down and pass it around, 9 bottles of beer on the wall.  
9 bottles of beer on the wall, 9 bottles of beer.  
Take one down and pass it around, 8 bottles of beer on the wall.  
8 bottles of beer on the wall, 8 bottles of beer.  
Take one down and pass it around, 7 bottles of beer on the wall.  
7 bottles of beer on the wall, 7 bottles of beer.  
Take one down and pass it around, 6 bottles of beer on the wall.  
6 bottles of beer on the wall, 6 bottles of beer.  
Take one down and pass it around, 5 bottles of beer on the wall.  
5 bottles of beer on the wall, 5 bottles of beer.  
Take one down and pass it around, 4 bottles of beer on the wall.  
4 bottles of beer on the wall, 4 bottles of beer.  
Take one down and pass it around, 3 bottles of beer on the wall.  
3 bottles of beer on the wall, 3 bottles of beer.  
Take one down and pass it around, 2 bottles of beer on the wall.  
2 bottles of beer on the wall, 2 bottles of beer.  
Take one down and pass it around, 1 bottle of beer on the wall.  
1 bottle of beer on the wall, 1 bottle of beer.  
Take one down and pass it around, no more bottles of beer on the wall.  
No more bottles of beer on the wall, no more bottles of beer.  
Go to the store and buy some more, 99 bottles of beer on the wall.

# Chapter II

## Introduction

Welcome to the first project of this long series. In this first project, after going through the resources that you have hopefully read by this point prior to doing these exercises you would have had a pretty good understanding of the basics of binary numbers as well as hexadecimals. These numbers will appear pretty frequently throughout the rest of this series.

As you could imagine, this will easily be the most tedious project. But do keep in mind that there is a very good reason for this as you will learn later on.



# Chapter III

## Goals

- Learn that you can convert any base to any other base
- Learn that you can add, subtract, divide, and multiply any base in the same manner as base-10.
- Learn that you can do the above without ever touching a mathematical operator.
- Grasp a better understanding of logical operators.


# Chapter IV

## Mandatory part

- The language you will be using is Python3.7 (earlier versions may or may not work)
- Any other restrictions will be noted per exercise.

# Chapter V

## Exercise 00: Base-10 to Binary

	Base-10 to Binary
Topics to study :	
Files to turn in : <code>tenToBinary.py</code>	
Notes : n/a	


- Create a Python program `tenToBinary.py` that given a base-10 number from the terminal converts it into the corresponding base-2 number and prints it to the terminal.
- Only need to handle positive numbers.
- The numbers given will be within the range of 0-2147483648.
- If it is outside of this range print out an error.



It is a bonus if you handle the negative range of -2147483648 to 0

# Chapter VI

## Exercise 01: Binary to Base-10

	Base-10 to Binary
Topics to study :	
Files to turn in : <code>binTen.py</code>	
Notes :	


- Create a Python program `binTen.py` that given a binary number from the terminal converts it into the corresponding base-10 number and prints it to the terminal.
- Only need to handle positive numbers.
- The numbers given will be within the range of 0-0b10000000000000000000000000000000.
- If it is outside of this range print out an error.



It is a bonus if you handle the negative range of  
-0b10000000000000000000000000000000 to 0

# Chapter VII

## Exercise 02: Binary to Hexadecimal

	Binary to Hexadecimal
Topics to study :	
Files to turn in : <code>binToHex.py</code>	
Notes :	


- Create a Python program `binToHex.py` that given a binary number from the terminal by first converting it to base-10 then finally hexadecimal and prints it to the terminal.
- Only need to handle positive numbers.
- The numbers given will be within the range of 0-0b10000000000000000000000000000000.
- If it is outside of this range print out an error.



It is a bonus if you handle the negative range of  
-0b10000000000000000000000000000000 to 0

# Chapter VIII

## Exercise 03: Bin to Hex Part 2

	Binary to Hexadecimal 2
Topics to study :	
Files to turn in : <code>binToHexShifting.py</code>	
Notes :	


- Create a Python program `binToHexShifting.py` that given a binary number from the terminal converts it to hexadecimal directly without intermediate conversions and prints it to the terminal.
- Only need to handle positive numbers.
- The numbers given will be within the range of `0-0b10000000000000000000000000000000`.
- If it is outside of this range print out an error.



It is a bonus if you handle the negative range of `-0b10000000000000000000000000000000` to `0`

# Chapter IX

## Exercise 04: Math Without Operators

	Math Without Operators
Topics to study :	
Files to turn in : <code>noOps.py</code>	
Notes :	


- Create a Python program `noOps.py` that given two (2) base-10 numbers from the terminal prints out the addition and subtraction of the two numbers without using mathematical operations.
- Only need to handle positive numbers.
- The numbers given will be within the range of 0-0b10000000000000000000000000000000.
- If it is outside of this range print out an error.



It is a bonus if you handle the negative range of  
-0b10000000000000000000000000000000 to 0

# Chapter X

## Exercise 05: Logical Operators

	Logical Operators
Topics to study :	
Files to turn in : <code>logicOps.py</code>	
Notes :	

- Create a Python program `logicOps.py` that given two (2) base-10 numbers from the terminal prints out the and, or, xor, and negation of both.



# Chapter XI

## Bonus part

This will be graded if and only if the rest of the project is perfect as always

- Convert any of the first three exercises into a any base to any base converter and name the file as `baseConverter.py`

# Chapter XII

## Turn-in and peer-evaluation

Turn your work in using your `Git` repository, as usual. Only work present on your repository will be graded in defense.