Lesson 3

Hexadecimal . Iterations . Array: list . Useful functions

Random Number Generator . Charles Babbage

Administrative

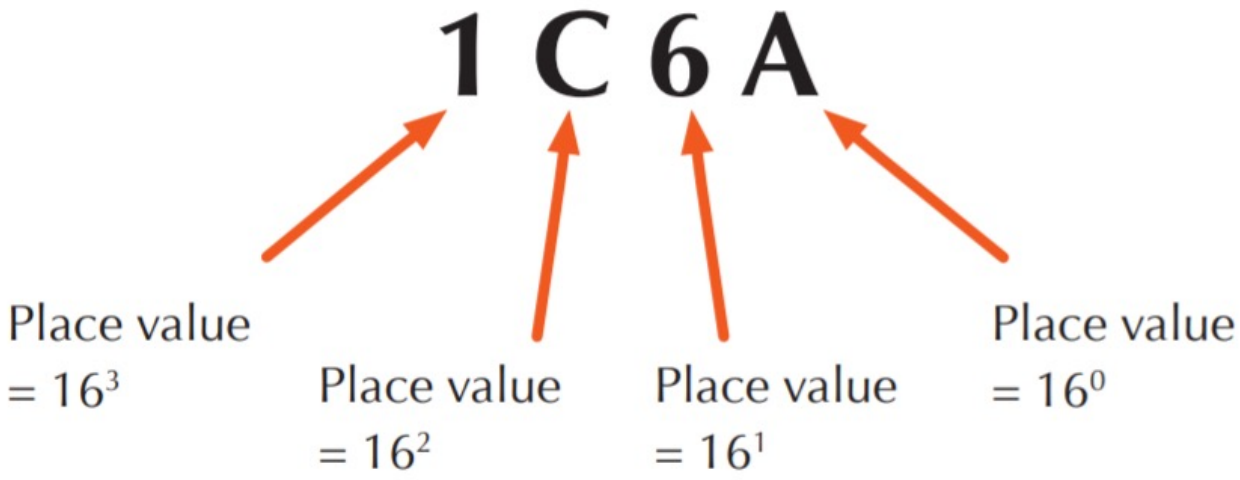
- Lesson 6: Practical Test 1
- Release of CA1 (Project) – Due Lesson 13

Hexadecimal – base 16

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Hexadecimal digit	0	1	2	3	4	5	6	7
Denary equivalent	0	1	2	3	4	5	6	7
Hexadecimal digit	8	9	A	B	C	D	E	F
Denary equivalent	8	9	10	11	12	13	14	15

How to convert ? (16 → 10)



How to convert ? (2 → 16)

Binary digit	0010	1000	0110	1011
Hexadecimal digit	2	8	6	B

Try . . .

- $(10101000111)_2$ to hexadecimal.

format()

```
>>> 12/5
2.4
>>> format(12/5, '.2f')
'2.40'
```

```
>>> 5/7
0.7142857142857143
>>> format(5/7, '.2f')
'0.71'
```

without use of format specifier

```
>>> tax = 0.08
>>> print('Your cost: $', (1 + tax) * 12.99)
Your cost: $ 14.029200000000001
```

with use of format specifier

```
>>> print('Your cost: $', format((1 + tax) * 12.99, '.2f'))
Your cost: $ 14.03
```

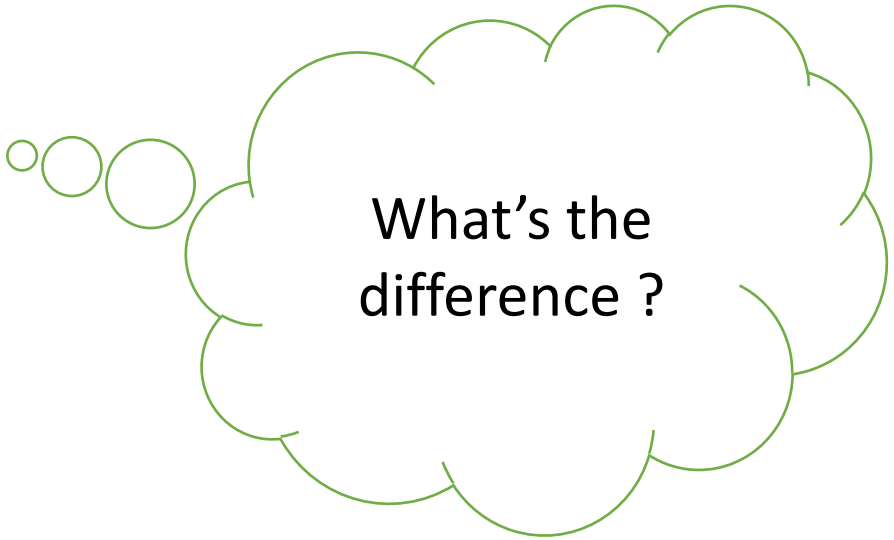
ord() , chr()

Space	00100000	32	A	01000001	65
!	00100001	33	B	01000010	66
"	00100010	34	C	01000011	67
#	00100011	35	.		
.			.		
.			Z	01011010	90
0	00110000	48	a	01100001	97
1	00110001	49	b	01100010	98
2	00110010	50	c	01100011	99
.			.		
.			.		
9	00111001	57	z	01111010	122

```
>>> ord('A')
>>> 65
```

Let’s think . . .

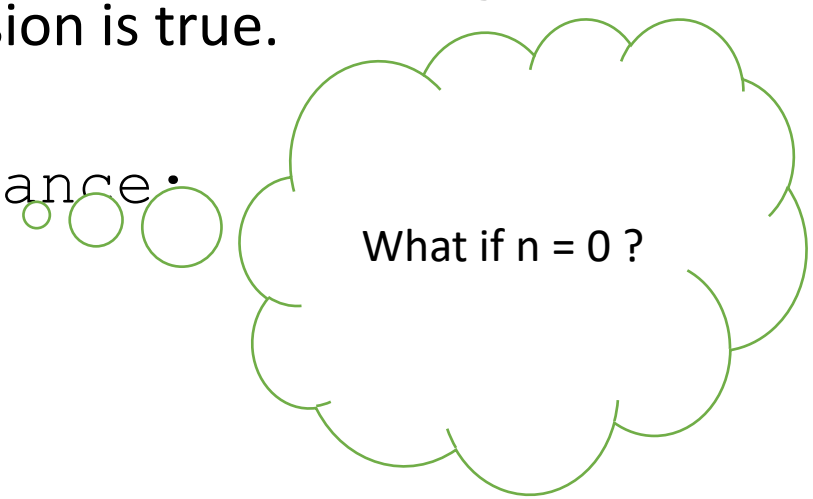
```
if True or true:
    print(‘true!’)

if true or True:
    print(‘true!’)
```



Short-Circuit (Lazy) Evaluation

- For logical and, if the first operand evaluates to false, then regardless of the value of the second operand, the expression is false.
- For logical or, if the first operand evaluates to true, regardless of the value of the second operand, the expression is true.

```
if n != 0 and 1/n < tolerance:
```




```
if n != 0:
    if 1/n < tolerance
```

In the Python programming language, short-circuit evaluation is used.

List

- Data type for storing multiple values in a sequence
- list constructor [ ]
- list() : takes in a sequence type and converts it into a list
- common sequence operations: len() , max() , min()
- mutation operations for list, `lst`:
  - `lst.append(x)` – adding an element x at the back
  - `lst.extend(x)` – adding a list
  - `lst.reverse()`
  - `lst.insert(i,x)`
  - `lst.pop(i)` – removes the element at index I and returns it
  - `lst.remove(x)` – removes the first occurrence of the element x
  - `lst.clear()` – empties the list

Loop examples

- factorial
- factorial(1) = 1
- factorial(3) = 3! = 1 x 2 x 3
- factorial(n) = n! = 1 x 2 x 3 x 4 x … x n

- We can define a function factorial using loop.

factorial

using for loop

```
def factorial(n):
    result = 1
    for i in range(2,n+1):
        result = result * i
    return result
```

using while loop

```
def factorial(n):
    result = 1
    counter = 1
    while counter <= n:
        result = result * counter
        counter = counter + 1
    return result
```

random number generator

- import random
- random.randint(num1 , num2)

Guessing Number Game

- Live demo

Coin Change Exercise Program

Write a program that implements an exercise for children to count change. It displays a random value between 1 and 99 cents and asks the user to enter a set of coins that sums exactly to the amount shown.

*change the coins denomination to 50 cents, 20 cents, 10 cents, 5 cents and 1 cent

Program Execution ...

```
The purpose of this exercise is to enter a number of coin values
that add up to a displayed target value.

Enter coins values as 1-penny, 5-nickel, 10-dime and 25-quarter.
Hit return after the last entered coin value.
---------------
Enter coins that add up to 63 cents, one per line.

Enter first coin: 25
Enter next coin: 25
Enter next coin: 10
Enter next coin:
Sorry - you only entered 60 cents.

Try again (y/n)?: y
Enter coins that add up to 21 cents, one per line.

Enter first coin: 11
Invalid entry
Enter next coin: 10
Enter next coin: 10
Enter next coin: 5
Sorry - total amount exceeds 21 cents.

Try again (y/n)?: y
Enter coins that add up to 83 cents, one per line.

Enter first coin: 25
Enter next coin: 25
Enter next coin: 25
Enter next coin: 5
Enter next coin: 1
Enter next coin: 1
Enter next coin: 1
Enter next coin:
Correct!

Try again (y/n)?: n
Thanks for playing ... goodbye
```

Who is Charles Babbage ?

- Interesting facts or stories ?
- What is his most significant work or contribution to t
  - Contribute in the forum