

loops_exercises_pdf

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1 An Introduction to Python

1.1 Loops

- 1.1.1 This notebook contains the programming exercises for [An Introduction to Python: Loops](#).
- 1.1.2 This is the PDF version of the Jupyter Notebook, provided only for convenience. It is recommended that you download the Jupyter Notebook(.ipynb) and interactively code your answers.

2 Exercises

2.1 Do the following problems.

2.1.1 Jupyter Notebook Shortcuts:

There are two modes when a cell is highlighted.

Command Mode: Press ESC to activate. The cell has a blue border if this mode is active. In this mode, you can add, delete, create, copy and paste cells.

- create a new cell above the current cell: a
- create a new cell below the current cell: b
- delete the current cell: dd
- change the current cell's type to "Code": y
- change the current cell's type to "Markdown": m

Edit Mode: Press ENTER to activate. The cell has a green border if this mode is active. In this mode, you can edit and type text into the cell.

- execute the current cell and create a new cell: SHIFT + ENTER

Provide an equivalent Python range() expression for each of the following integer sequences.

- (a) 1,2,3,4,5
- (b) 5,4,3,2,1
- (c) 5,10,15,20,25,30

(d) 30,25,20,15,10,5

(e) Empty sequence

Print out the message "Hello!" 10 times separated by spaces.

Write a for loop that prints out all even numbers between 1 and 24 separated by spaces. Use python's modulo (%) operator

Write a for loop that prints out the numbers in descending order from 20 to 1 separated by spaces.

Write a while loop to print out all multiples of 3 between 3 and 30 separated by spaces.

Rewrite the following code fragment so it eliminates the continue statement. Your new code's logic should be simpler than the logic of this fragment.

```
x = 5
while x > 0:
    y = int(input())
    if y == 25:
        continue
    x -= 1
    print('x =', x)
```

Suppose we like to generate the following sequence of numbers: Given a positive starting number n .

- If the current term is even, the next term is the current term divided by 2.

- If the current term is odd, the next term is the 3 times the previous term plus 1.

Generate the sequence until the sequence reaches a 1. The famous Collatz Conjecture says that this sequence will always reach 1 regardless of the initial starting value. Example: $n = 12, 6, 3, 10, 5, 16, 8, 4, 2, 1$.

Write a segment of code that ask the user to input a positive integer n and use a while loop that generates the Collatz sequence.

Write nested loops that generate the following:

a)

```
2 2 2 2
4 4 4 4
6 6 6 6
8 8 8 8
```

b)

1 2 3 4 5

1 2 3 4

1 2 3

1 2

1

Use the code above for generating the Collatz sequence and write a segment of code that prints out the Collatz sequence for each number from 1-10.