Python: Data Structures and Sequences

Tuple

- In python, a tuple is an immutable sequence of elements. it is similar to a list, but the elements of a tuple cannot be modified once they are created.
- Tuple is a collection data type in python. It is usefule for storing multiple related values as a single unit.
- Sequence types in python - list, tuple and range

Creating a Tuple

- A tuple is creatd by placing all the items (elements) inside parentheses () and separated by commas. The parentheses are optiona, however, it is a good practive to use them.

Example 1

Some common ways to create tuples in Python include:

```
tup = (1,2,3)
print(tup) # Output: (1, 2, 3)
# check the type of variable
print(type(tup)) # Output: <class 'tuple'>

# another example to create tuple
tup1 = 4,5,6
print(tup1) # Output: (4, 5, 6)

# tuple with mixed datatypes
tup_mixed = (7, "String", 7.8)
print(tup_mixed)

# Tuples may be nested
nested_tup = tup1, (7,8)
print(nested_tup) #Output: ((4, 5,6), (7, 8))

# using the 'tuple()' function
tup3 = ([7,2,9])
print(tup3) #Output (7,2,9)

tup4 = tuple('string')
print(tup4) # Output: ('s','t','r','i','n','g')
```

A nested tuple is a tuple that contains one or more tuples as element.

Empty and single item tuple

- A special problem is the construction of tuples containing 0 or 1 item.

- Empty tuples are constructed by an empty pair of parentheses
- A tuple with one item is constructed by following a value with a comma (it is not sufficient to enclose a single value in parentheses.

Accessing the elements of Tuple

Example #2

```
# Tuples are immutable
# but they can contain mutable objects
```

Unpacking tuples

Tuple methods

Tuple

- #1 Tuple Assignment
- #2 Tuple Assignment -How to create a tuple in Python
- Learn how to print elements of a tuple
- How to Calculate the Sum of a Tuple Using a For Loop
- How to create an Empty tuple and Single value tuple
- How to: Access Tuple Items in Python
- Exercise #11: How to Swap Variables in One Line of Code using Tuple Unpacking
-

List

A **list** in Python is one of the most commonly used data structures. It allows you to store a collection of items (which can be of different types) in a single variable. Lists are very flexible and easy to use, making them a great tool for beginners to understand.

Key Characteristics of Python Lists:

1. **Ordered**: The items in a list have a specific order, and this order will not change unless explicitly modified.
2. **Mutable**: You can change, add, or remove items after the list has been created.
3. **Heterogeneous**: A list can contain different data types, such as integers, strings, and even other lists.
4. **Indexed**: Each item in a list has an index, starting from `0` for the first item.

Creating a List

You can create a list by placing items inside square brackets `[]`, separated by commas.

```
# A list of integers
numbers = [1, 2, 3, 4, 5]

# A list of strings
fruits = ["apple", "banana", "cherry"]

# A list of mixed data types
mixed_list = [1, "hello", 3.14, True]

# An empty list
empty_list = []
```

Accessing Elements in a List

You can access individual elements in a list using their index.

```
# Access the first element (index 0)
print(fruits[0])  # Output: apple

# Access the second element (index 1)
print(fruits[1])  # Output: banana

# Access the last element (index -1)
print(fruits[-1])  # Output: cherry
```

Modifying Elements in a List

Since lists are mutable, you can change an element in a list by assigning a new value to a specific index.

```
# Change the first element of the list
fruits[0] = "orange"
print(fruits)  # Output: ['orange', 'banana', 'cherry']
```

Adding Elements to a List

You can add elements to a list using methods like `append()` or `insert()`.

```
# Append an element to the end of the list
fruits.append("grape")
print(fruits)  # Output: ['orange', 'banana', 'cherry', 'grape']

# Insert an element at a specific position
fruits.insert(1, "mango")
print(fruits)  # Output: ['orange', 'mango', 'banana', 'cherry', 'grape']
```

Removing Elements from a List

Elements can be removed from a list using methods like `remove()`, `pop()`, or `del`.

```
# Remove a specific element by value
fruits.remove("banana")
print(fruits)  # Output: ['orange', 'mango', 'cherry', 'grape']

# Remove an element by index using pop
fruits.pop(2)
print(fruits)  # Output: ['orange', 'mango', 'grape']

# Remove an element by index using del
del fruits[0]
print(fruits)  # Output: ['mango', 'grape']
```

Slicing Lists

You can access a range of elements from a list using slicing.

```
# Get the first two elements
print(fruits[:2])  # Output: ['mango', 'grape']

# Get elements from the second to the end
print(fruits[1:])  # Output: ['grape']
```

Iterating Through a List

You can use a loop to iterate through all the elements in a list.

```
# Print each fruit in the list
for fruit in fruits:
    print(fruit)

# Output:
# mango
# grape
```

List Methods

Python lists come with many useful methods, such as:

- `append()`: Adds an element to the end of the list.
- `extend()`: Adds all elements of another list to the end.
- `insert()`: Inserts an element at a specified position.
- `remove()`: Removes the first occurrence of an element.

- `pop()`: Removes and returns an element at a specified position.
- `sort()`: Sorts the list in ascending order.
- `reverse()`: Reverses the order of elements in the list.

Example: Using Lists in a Simple Program

Here's a simple example to illustrate the use of lists in a practical scenario:

```
# Creating a shopping list
shopping_list = ["milk", "eggs", "bread"]

# Adding items to the list
shopping_list.append("butter")
shopping_list.append("apples")

# Removing an item
shopping_list.remove("eggs")

# Printing the final list
print("Final shopping list:", shopping_list)

# Output:
# Final shopping list: ['milk', 'bread', 'butter', 'apples']
```

Summary

Lists are a foundational data structure in Python that allow you to store and manage collections of items. They are versatile, easy to use, and an essential concept for anyone starting to learn Python.

- Video: 6 Ways to use List in For loop in Python
- Video: Read data from list using For loops in Python
- How to use list
- Python List Slicing
- Python Nested List
- How to modify a list by replacing multiple elements with a single element
- Adding and Removing Elements from a Python List
- Check if Data Structure is Empty Using 'not' Operator
- Remove duplicate elements from a list
- List Index Function: Find the Index of an Element in a List
- List pop() Method
- **Python set examples:**
- How to Find Duplicates in a List using Set and List Functions

Built-in Sequence Functions

- #1 Python zip() Function
- #2 Python Zip Function: Handling Lists with Different Numbers of Elements
- Python Iterators and Iterables: How to Loop Over Lists and Iterators

- How to Iterate Over Tuples with the Enumerate Function
- Finding the maximum value in a list using a one-liner
- Find the sum of all even numbers between 1 and 100 using a one-liner
- Counting the number of occurrences of an element in a list

dict

- Use of dict
- How to Print a Dictionary
- Python Dictionary with For Loop
- How to Merge Dictionaries with the | Operator
- dictionary copy() method

set

- How to: Add or Remove Elements in a Set
- How to: Create Empty Set in Python
- Find the Union of Two Sets in Python
- Python Challenge to test your knowledge Quiz1 Quiz2 Quiz3

Why Integers, Strings, and Tuples Are Immutable in Python [1]

Integer (Immutable)

Integers are numbers without any fractional part. In Python, integers are immutable, meaning their value cannot be changed once they are created.

Example:

```
x = 10
print(x)  # Output: 10

x = 20  # This creates a new integer object and binds x to it
print(x)  # Output: 20
```

In this example, when `x` is reassigned from 10 to 20, a new integer object is created, and `x` is updated to reference the new object.

String (Immutable)

Strings are sequences of characters. In Python, strings are also immutable. Any operation that modifies a string will create a new string rather than altering the existing one.

Example:

```
s = "hello"
print(s)  # Output: hello

s = s + " world"  # This creates a new string object
print(s)  # Output: hello world
```

Here, concatenating `" world"` to `s` does not change the original string `"hello"`. Instead, a new string `"hello world"` is created and assigned to `s`.

Tuple (Immutable)

Tuples are ordered collections of elements. Like integers and strings, tuples are immutable. Once a tuple is created, you cannot change its contents.

Example:

```
t = (1, 2, 3)
print(t)  # Output: (1, 2, 3)

# Attempting to modify the tuple will raise an error
try:
    t[0] = 4
except TypeError as e:
    print(e)  # Output: 'tuple' object does not support item assignment

# You can create a new tuple
t = (4, 5, 6)
print(t)  # Output: (4, 5, 6)
```

In this example, trying to change the first element of `t` results in a `TypeError` because tuples are immutable. To change the contents, a new tuple must be created.

These examples illustrate that integers, strings, and tuples in Python are immutable, meaning their values cannot be changed after they are created.

Key Terms

True/False (Mark T for True and F for False)

Answer Key (True/False):

Multiple Choice (Select the best answer)

What is the output of the following code? [Python Quiz #15]

```
a = ('34.5')
print(type(a))
```

- A) <class 'list'>
- B) <class 'tuple'>
- C) <class 'int'>
- D) <class 'str'>

Watch the video for the answer: https://youtube.com/shorts/uMtHVgPSymw

What is the output of the following code? [Python Quiz #18]

```
a = [1, 2, 3]
b = [4, 5, 6]
c = a + b
print(c)
```

- A) [1, 2, 3]
- B) [4, 5, 6]
- C) [1, 2, 3, 4, 5, 6]
- D) Error

Watch the video for the answer: https://youtube.com/shorts/rEDmm9ry7wE?si=ce2iYVXHbCEjLm6W

What is the output of the following code? [Python Quiz #19]

```
a = [1, 2, 3, 4]
b = a
b[0] = 0
print(a)
```

- A) [0, 2, 3, 4]
- B) [1, 2, 3, 4]
- C) [0, 1, 2, 3, 4]
- D) [1, 0, 3, 4]

Watch the video for the answer: https://youtu.be/ZWB4dfUYz1k?si=aYNoLd_81_-9oLfR

What is the output of the following code? [Python Quiz #20]

```
my_list = [1, 2, 3, 4, 5]
print(my_list[1::2])
```

- **A)** [1, 3, 5]
- **B)** [2, 4]
- **C)** [2, 4, 5]
- **D)** [1, 3]

Watch the video for the answer: https://youtube.com/shorts/UH5znVEFehI

What is the output of the following code? [Python Quiz #21]

```
my_list = [8, 9, 11, 12]
print(my_list[1:-1])
```

- A) [8, 9, 11, 12]
- B) [9, 11, 12]
- C) [9, 11]
- D) [8, 9, 11]

Watch the video for the answer: https://youtube.com/shorts/PBBnTGfFm4o?si=Z1TlMu24412nVKG_

What is the output of the following code? [Python Quiz #25]

```
my_dict = {
    'a': 1, 'b': 2,
    'c': 3
}

for key in my_dict:
    print(my_dict[key])
```

- A) abc
- B) 123
- C) {1, 2, 3}
- D) {a, b, c}

Watch the video for the answer: https://youtube.com/shorts/wofaOXA0SVA?si=EY4-_ndR8_qbB6zF

What is the output of the following code? [Python Quiz #26]

```
my_list = [
    "apple",
    "banana",
    "cherry"
]

print(len(my_list))
```

Options:

- A) 6
- B) 3
- C) [apple, banana, cherry]

- D) Error

Watch the video for the answer: https://youtube.com/shorts/t7SVFVPrPlk?si=h9nAfaOPofOLnwu4

What is the output of the following code? [Python Quiz #32] Code Explanation:

```
a = [1, 2, 3]  # Creates a list named 'a' with elements 1, 2, and 3
b = a.copy()   # Creates a copy of list 'a' and assigns it to 'b'
a[0] = 4       # Modifies the first element of list 'a' to 4
print(b)       # Prints the contents of list 'b'
```

- A) [4, 2, 3]
- B) [1, 2, 3]
- C) [2, 4, 3]
- D) Error

Watch the video for the answer: https://youtube.com/shorts/Jub8TgDntRQ?si=wt8IPaFgr4BMEk7E

What is the output of the following code? Python Quiz #34

```
a = [1, 2, 3]
b = a[:]
b[0] = 4
print(a)
```

- A) [1, 2, 3]
- B) [4, 2, 3]
- C) [4, 4, 3]
- D) [4, 2, 3]

Watch the video for the answer: https://youtube.com/shorts/rslioE6VWOQ

What is the output of the following code? [Python Quiz #35] Code:

```
my_list = [1, 2, 3, 4, 5]
for i in range(len(my_list)):
    my_list[i] *= 2
print(my_list)
```

Options:

- A) [1, 2, 3, 4, 5]
- B) [2, 4, 6, 8, 10]
- C) [1, 4, 9, 16, 25]
- D) None

Watch the video for the answer: https://youtube.com/shorts/QffZTQasQSs?si=6ZW4auXECcvTGQgn

What is the data type of the following value? frozenset({1, 2, 3}) a) list b) tuple c) set d) frozenset

Answer: d) frozenset

What is the data type of the following value? {1, 2, 3} a) list b) tuple c) set d) dict

Answer: c) set

What is the data type of the following value? {1, 2, 3} a) list b) tuple c) set d) dict

Answer: c) set

What is the data type of the following value? (1, 2, 3) a) list b) tuple c) set d) dict

Answer: b) tuple

What is the data type of the following value? {"name": "Alice", "age": 25} a) list b) tuple c) set d) dict

Answer: d) dict

What is the data type of the following value? [1, 2, 3] a) list b) tuple c) set d) dict

Answer: a) list

What is the correct way to create a set in Python?

a) set = [1, 2, 3] b) set = (1, 2 ,3) c) set = {1, 2 ,3} d) set = <1, 2 ,3>

Answer: c) set = {1, 2 ,3}

#58 What is the correct way to create a loop in Python?

a) for i in range(10): b) while i < 10: c) repeat i = 0 to 9: d) either a or b

Answer: d) either a or b

#53 What is the correct way to create a dictionary in Python?

a) dict = [key: value] b) dict = (key: value) c) dict = {key: value} d) dict = <key: value>

Answer: c) dict = {key: value}

#52 What is the correct way to create a list in Python?

a) list = [1, 2, 3] b) list = (1, 2, 3) c) list = {1, 2, 3} d) list = <1, 2, 3>

Watch this video for the answer:

#47 In Python, What is the output of the following code?

a = [1, 2, 3, 4] b = [5, 7, 4, 9,2] print (a[-1] in b)

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True False Error None

#35 What is the output of the following code?

def fun(arr): arr = arr[::-1]

arr = [1,2,3,4,5] fun(arr) print(arr)

Watch the Video Tutorial for the Answer: https://youtube.com/shorts/Ix-h6WR-vQM?feature=share

#python #pythonpoll #MCQsTest #yasirbhutta

[1,2,3,4,5] [5,4,3,2,1] [] Error

Answer: A.

#24 What is the syntax to create a union of two sets in Python?

Watch the Video Tutorial for the Answer: https://youtu.be/YDyCNYCUK9A

#python #pythonpoll #MCQsTest #yasirbhutta

a. set1 + set2 b. set1.union(set2) c. set1 & set2 d. set1.merge(set2)

Answer: b. set1.union(set2)

#26 What is the result of the following code?

set1 = {1, 2, 3} set2 = {3, 4, 5} set3 = set1.union(set2) print(set3)

Watch the Video Tutorial for the Answer: https://youtu.be/YDyCNYCUK9A

#python #pythonpoll #MCQsTest #yasirbhutta

a. {1, 2, 3} b. {3, 4, 5} c. {1, 2, 3, 4, 5} d. {3} Answer: c. {1, 2, 3, 4, 5}

Is it possible to use the union operator | to combine sets with different data types? a. Yes b. No Answer: b. No

#25 Can the union of two sets contain duplicates?

Watch the Video Tutorial for the Answer: https://youtu.be/YDyCNYCUK9A

#python #pythonpoll #MCQsTest #yasirbhutta

a. Yes b. No Answer: b. No

#27 What happens when you try to add an element to a set that already exists in the set?

Watch the Video Tutorial for the Answer: https://youtu.be/YDyCNYCUK9A

#python #pythonpoll #MCQsTest #yasirbhutta

a. A TypeError occurs b. The element is added as a duplicate c. Nothing happens, the element is not added

Answer: c. Nothing happens, the element is not added.

What is the output of the following code?

list1 = [10,20,10,'10',20] set1 = set(list1) print(set1)

5 3 2 4 Answer: B) 3

What is the output of the following code?

set1 = {1,2,3} set2 = {1,2,3} print(*(set1+set2))

Error {2,4,6} [2,4,6] [1,2,3]

Answer: A) error + operator is not supported for set

What does the "in" operator do in Python? a) check if a value is present in a list b) check if a value is equal to another value c) check if a variable is defined Answer: a) check if a value is present in a list

Can the "in" operator be used with dictionaries in Python? a) yes b) no Answer: a) yes

How would you check if the value "dog" is in the list ['cat', 'dog', 'elephant'] using the "in" operator? a) 'dog' in ['cat', 'dog', 'elephant'] b) ['dog'] in ['cat', 'dog', 'elephant'] Answer: a) 'dog' in ['cat', 'dog', 'elephant']

Can the "in" operator be used to check if an element is present in a set in Python? a) yes b) no Answer: a) yes

How would you check if the value "dog" is in the set {'cat', 'dog', 'elephant'} using the "in" operator? a) 'dog' in {'cat', 'dog', 'elephant'} b) {'dog'} in {'cat', 'dog', 'elephant'} Answer: a) 'dog' in {'cat', 'dog', 'elephant'}

#14 Is the "in" operator faster for checking if an element is present in a set compared to a list in Python?

https://lucasmagnum.medium.com/pythontip-list-vs-set-performance-experiments-dfbe4f72d47f

a) yes b) no Answer: a) yes

#13 What does the "in" operator do in Python?

a) check if a value is present in a list b) check if a value is equal to another value c) check if a variable is defined Answer: a) check if a value is present in a list

Can the "in" operator be used with dictionaries in Python?

a) yes b) no Answer: a) yes

How would you check if the value "dog" is in the list ['cat', 'dog', 'elephant'] using the "in" operator?

a) 'dog' in ['cat', 'dog', 'elephant'] b) ['dog'] in ['cat', 'dog', 'elephant'] Answer: a) 'dog' in ['cat', 'dog', 'elephant']

What is the operator used to check if an element is present in a set in python?

in contains has exit

Answer: A) in

What is the output of the following code?

t=(1,2,4,3) t[1:3] a) (1, 2) b) (1, 2, 4) c) (2, 4) d) (2, 4, 3)

#8 What is the output of the following code?

z=set('stri$ng') print('r' in z)

Python YouTube Playlist: https://www.youtube.com/playlist?list=PLKYRx0Ibk7Vi-CC7ik98qT0VKK0F7ikja

a) Error b) True c) False d) No output

Which of the following is a Python tuple?

Python YouTube Playlist: https://www.youtube.com/playlist?list=PLKYRx0Ibk7Vi-CC7ik98qT0VKK0F7ikja

a) {1, 2, 3} b) {} c) [1, 2, 3] d) (1, 2, 3)

#9 Which of the following Python statements will result in the output: 6

A = [[1, 2, 3], [4, 5, 6], [7, 8, 9]]

Python YouTube Playlist: https://www.youtube.com/playlist?list=PLKYRx0Ibk7Vi-CC7ik98qT0VKK0F7ikja

a) A[2][1] b) A[1][2] c) A[3][2] d) A[2][3]

Answer: b Explanation: The output that is required is 6, that is, row 2, item 3. This position is represented by the statement: A[1][2].

11# Which of the following statements is used to create an empty set in Python?

related video:https://youtube.com/shorts/nmI7BGXPA4I

a) ( ) b) [ ] c) { } d) set() Explanation: { } creates a dictionary not a set. Only set() creates an empty set.

#15 What method is used to add an element to the end of a list in Python?

Watch the Video Tutorial for the Answer:https://youtu.be/x98wvk-4MHw

#python #pythonpoll #MCQsTest

A) append() B) insert() C) extend() D) append_list() Answer: A) append()

#16 How do you add an element to a specific index in a list in Python?

Watch the Video Tutorial for the Answer: https://youtu.be/x98wvk-4MHw

#python #pythonpoll #MCQsTest

A) add_index() B) insert() C) extend() D) append() Answer: B) insert()

#17 What function is used to remove the last element from a list in Python?

Watch the Video Tutorial for the Answer:https://youtu.be/x98wvk-4MHw

#python #pythonpoll #MCQsTest #yasirbhutta

A) del_last() B) remove_last() C) pop() D) delete_end() Answer: C) pop()

#18 How can you remove the first occurrence of an element from a list in Python?

Watch the Video Tutorial for the Answer: https://youtu.be/x98wvk-4MHw

#python #pythonpoll #MCQsTest #yasirbhutta

A) remove() B) delete_first() C) pop_first() D) del_first() Answer: A) remove()

What is the output of the following code?

list1 = [12,98,23,70,66] list1[1:4] = [20] print(list1)

[12,20,66] [12,20,23,70,66] [12,98,23,20,66] Error

Which of the following is not a core data type in Python? a) List b) Tuple c) Dictionary d) Class

How would you create a tuple with only one element?

a) my_tuple = (1,) b) my_tuple = (1) c) my_tuple = [1] d) my_tuple = {1}

What is the result of the following code?

x = [1, 2, 3] y = x y[1] = 4 print(x)

a) [1, 2, 3] b) [1, 4, 3] c) [4, 2, 3] d) [1, 2, 4]

What is the result of the following code?

x = [1, 2, 3] y = x y = [4, 5, 6]

print(x) a) [1, 2, 3] b) [4, 5, 6] c) [1, 4, 5, 6] d) [4, 5, 6, 1, 2, 3]

How would you add an element to the end of a list in Python? a) list.append(element) b) list += element c) list.push(element) d) list = list + [element]

#5 What is the result of the following code?

x = {1: 'a', 2: 'b', 3: 'c'} y = x.copy() y[1] = 'd' print(x)

related video: https://youtube.com/shorts/PXp9uzvKFdU?feature=share

a) {1: 'a', 2: 'b', 3: 'c'} b) {1: 'd', 2: 'b', 3: 'c'} c) {1: 'd', 2: 'b', 3: 'c', 4: 'd'} d) {1: 'a', 2: 'b', 3: 'c', 1: 'd'}

How do you create an empty tuple in Python?

related video: https://youtu.be/nGIWcYXj580

a) tuple() b) {} c) () d) [] Answer: c) ()

How do you create a tuple with multiple elements in Python? related video: https://youtu.be/QpRiHuQycXg

a) tuple(1, 2, 3) b) (1, 2, 3) c) {1, 2, 3} d) [1, 2, 3] Answer: b) (1, 2, 3)

What is the correct way to create a tuple with a single element in Python? related video: https://youtu.be/nGIWcYXj580

a) tuple(1) b) (1,) c) {1} d) [1] Answer: b) (1,)

How do you add an element to an existing tuple in Python? a) tuple.append(element) b) tuple + (element,) c) tuple.extend(element) d) Tuples are immutable, so it is not possible to add an element to an existing tuple. Answer: d) Tuples are immutable, so it is not possible to add an element to an existing tuple.

How do you remove an element from a tuple in Python? a) tuple.remove(element) b) tuple.pop(element) c) Tuples are immutable, so it is not possible to remove an element from a tuple. d) del tuple[element] Answer: c) Tuples are immutable, so it is not possible to remove an element from a tuple.

What is the output of this code in PYTHON? list1=[1,2,3,4,5] print(list1[:4].pop())

[1,2,3,4] 5 [1,2,3,5] 4

What is the output of this code in PYTHON? list1=[1,2,34,5] print(list1[:4].pop())

[1,2,3,4] 5 [1,2,3,5] 4

Answer key (Mutiple Choice):

Fill in the Blanks

Answer Key (Fill in the Blanks):

Exercises

Review Questions

References and Bibliography

[1] B. E. Prep, “Difference Between Mutable and Immutable in Python | Mutable vs Immutable Objects,” BYJU’S Exam Prep, Sep. 24, 2023. https://byjusexamprep.com/gate-cse/difference-between-mutable-and-immutable (accessed Jul. 27, 2024).

Here's an expanded list of 50 exercises designed to help beginners understand and practice using `for` loops in Python. These exercises cover a variety of basic, intermediate, and advanced concepts to provide a comprehensive learning experience.

Basic Exercises

6. **Print elements of a list**: Use a `for` loop to print each element in the list `[10, 20, 30, 40, 50]`.
7. **Print elements of a matrix**: Use nested `for` loops to print each element of a 2x2 matrix, e.g., `[[1, 2], [3, 4]]`.
8. **Find the largest number in a list**: Write a `for` loop to find the largest number in the list `[34, 78, 23, 89, 12]`.
9. **Remove duplicates from a list**: Write a `for` loop to remove duplicates from the list `[1, 2, 2, 3, 4, 4, 5]`.

10. **Calculate the average of a list**: Use a `for` loop to calculate the average of numbers in the list `[10, 20, 30, 40, 50]`.

Advanced Exercises

23. **Transpose a matrix**: Write a `for` loop to transpose a 2x3 matrix, e.g., `[[1, 2, 3], [4, 5, 6]]` should become `[[1, 4], [2, 5], [3, 6]]`.
24. **Find the common elements in two lists**: Write a `for` loop to find the common elements in the lists `[1, 2, 3, 4]` and `[3, 4, 5, 6]`.
25. **Flatten a list of lists**: Write a `for` loop to flatten the list `[[1, 2], [3, 4], [5, 6]]` into `[1, 2, 3, 4, 5, 6]`.
26. **Print all the indexes of a list**: Write a `for` loop to print all the indexes of the list `[10, 20, 30, 40, 50]`.
27. **Generate a list of the first 10 square numbers**: Write a `for` loop to create a list of the first 10 square numbers.
28. **Print numbers in a list that are greater than 10**: Use a `for` loop to print numbers from the list `[5, 12, 17, 9, 3, 21]` that are greater than 10.
29. **Find the sum of even numbers in a list**: Write a `for` loop to calculate the sum of all even numbers in the list `[1, 2, 3, 4, 5, 6, 7, 8, 9, 10]`.
30. **Calculate the product of all numbers in a list**: Write a `for` loop to calculate the product of all numbers in the list `[1, 2, 3, 4]`.
31. **Find the minimum value in a list**: Write a `for` loop to find the smallest number in the list `[34, 78, 23, 89, 12]`.
32. **Convert a list of Celsius temperatures to Fahrenheit**: Use a `for` loop to convert the list `[0, 10, 20, 30, 40]` to Fahrenheit using the formula `(Celsius * 9/5) + 32`.
33. **Reverse the elements of a list**: Write a `for` loop to reverse the elements of the list `[1, 2, 3, 4, 5]`.
34. **Calculate the sum of squares of a list of numbers**: Write a `for` loop to calculate the sum of the squares of numbers in the list `[1, 2, 3, 4, 5]`.
35. **Find the intersection of two lists**: Use a `for` loop to find the common elements in the lists `[1, 2, 3, 4, 5]` and `[4, 5, 6, 7, 8]`.
36. **Count the frequency of each element in a list**: Write a `for` loop to count the occurrences of each element in the list `[1, 2, 2, 3, 3, 3, 4, 4, 4, 4]`.
37. **Generate a dictionary with numbers and their squares**: Write a `for` loop to create a dictionary where keys are numbers from 1 to 5 and values are their squares.
38. **Print the transpose of a 3x3 matrix**: Write a `for` loop to transpose the matrix `[[1, 2, 3], [4, 5, 6], [7, 8, 9]]`.

What is the output of the following code? Python Quiz #23

```
a = [1, 2, 3, 4, 5]
for i in range(0, len(a), 2):
    print(a[i])
```

- A) 135
- B) 24
- C) 12345
- D) Syntax error

Watch the video for the answer: https://youtube.com/shorts/yrTnxNkrXH4?si=EUAzZiONKORP4nIU

> What is the output of the following code?

```
fruits = ["Apple", "Banana", "Cherry"]
for i, fruit in enumerate(fruits):
    if i == 1:
        print(fruit)
```

1. ☐ Apple
2. ☐ Banana
3. ☐ Cherry
4. ☐ Error

related video: https://youtu.be/-FErgsl9njQ

Which of the following is the correct way to iterate over elements in a list using a for loop? a. for item in my_list: b. for i = 0; i < len(my_list): c. for element = my_list: d. for (i, item) in enumerate(my_list):

How can you iterate over both the index and elements of a list using a for loop? a. for i in my_list: b. for (i, element) in enumerate(my_list): c. for element in range(my_list): d. for index, element in my_list:

What is the output of the following code?

```
numbers = [1, 2, 3, 4, 5]
for x in numbers:
    print(x * 2)
```

a. 2 4 6 8 10 b. 1 2 3 4 5 c. 1 4 9 16 25 d. 2 4 8 16 32

How many times will the following loop execute?

```
for i in [1, 2, 3, 3]:
  print("Hello")
```

```
- A) 3
- B) 4
- C) 1
- D) Infinitely
```