Programming Session

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Computer Science and Mathematics
Preparatory Course

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If-Else

If and else are organized by indentation and colons

```python
x = 3.5
is_x_4 = False
if x == 4:
    is_x_4 = True  # indented block is called only
    print("x is 4")  # if <condition> applies
else:
    print("x is not 4")
# Regular program continues here
```
While Loops

- Print the numbers from 1 to 10

```python
goal = 5  # define two variables for the exit condition
test = 0

while test != goal:
    test = test + 1  # Increase test by 1
    print(test)  # prints 1,2,3,4,5 a number per loop
```
The List Datatype

- Lists allow to manage a collection of variables

```python
names = ['Alice', 'Bob', 'Carl', 'Dora']
numbers = [1, 2, 3, 5, 8]
```

- Accessing and modifying elements in a list

```python
print(names)  # ['Alice', 'Bob', 'Carl', 'Dora']
single_name = names[2]  # single_name = 'Carl'
first_element = numbers[0]  # first_element = 1
last_name = names[len(names)-1]  # last_name = 'Dora'

names[1] = 'Bert'  # names = ['Alice', 'Bert', 'Carl', 'Dora']
```
Operations on Lists

Example Operations

```
numbers = [1,2,3,5,8]
names = ['Alice','Bob','Carl']
count = len(names) #count=3
names.append('Daisy') #['Alice','Bob','Carl','Daisy']
numbers2 = [13,21,34]
numbers3 = numbers + numbers2 #[1,2,3,5,8,13,21,34]
subset = numbers3[2:5] #[3,5,8]
#characters from position 2 (included) to 5 (excluded)
```
Helpful Functions

- The random module

```python
import random  # import the module similar to import math
# assigns dice_roll a number between 1 and 6
dice_roll = random.randint(1, 6)
# assigns coin_flip either a 0 or 1
coin_flip = random.randint(0, 1)
```

- Deleting list elements

```python
names = ["alf", "donald", "charly brown", "bud spencer"]
del names[1]  # deletes the second element
print(names)  # ["alf", "charly brown", "bud spencer"]
```
Tasks: Control Statements

1. Write a program that asks the user for number input until the sum of the inputs is greater than 20.
   - Start with a variable $S$ that is initialized with the value 0.
   - Create a while-loop that ends when $S$ is greater than 20
   - Inside the while-loop ask the user for input and add the input to $S$. (Do not forget to typecast the input)

2. Write a Guessing Game, where the script chooses a random integer between 0 and 20 and the user has to guess it. With each guess the user gets told if his guess was higher or lower than the desired number.
   - Start by assigning a random integer to a variable using `random.randint(0,20)`
   - Create a while-loop in which the user is asked for a number
   - Depending on the number input tell the user whether his guess was smaller, higher or equal to the desired value
   - Think about how to end the while-loop
Tasks: Lists

3. Write a script that returns the biggest element in a list
   - Create a list with arbitrary numbers of your choice
   - Loop through the list with a for loop
   - In each loop compare the current list element with your current estimate of the highest number

4. Write a script that looks for a specific element in the list and deletes it
   - Loop through the list with a for-loop and store the elements position in a variable
   - After the for loop remove the element at that position with the `del` command

5. (Bonus) Write a script that takes a list and transfers its elements to a second list in sorted order.
   - Look for the smallest element in the first list. Write it to the second list. Delete it in the first list. Repeat.