

# 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
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```
x = 3.5
is_x_4 = False
if x == 4 : #if <condition> :
    is_x_4 = True #indented block is called only
    print("x is 4") #if <condition> applies
else : #else is on the same level as if
    print("x is not 4")
#Regular program continues here
```

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# While Loops

- ▶ Print the numbers from 1 to 10

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```
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
```

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# The List Datatype

- ▶ Lists allow to manage a collection of variables

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

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- ▶ Accessing and modifying elements in a lists

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```
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']
```

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# Operations on Lists

## ► Example Operations

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```
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)
```

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# Helpful Functions

- ▶ The random module

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```
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)
```

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- ▶ Deleting list elements

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

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## 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

- 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
- 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
- (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.