

Programming

Lab Sessions

Groups

- Groups and groups numbers have been uploaded to <http://marcomarinho.com/media/resources/GroupsDI2006.pdf>
- If you have not e-mailed me, do it by the end of the day. It might not be possible to address preferences

Assignment 0

- A **very** simple assignment will be uploaded today.
 - **No oral presentation for this one**
 - One-week deadline
 - To ensure you have a capable python environment and that the workflow with submission in BB works

Installing Python

- If you want to have python on your machine, please follow this tutorial:
<https://realpython.com/installing-python/>
- You can then download a free IDE here:
<https://code.visualstudio.com/download>
- All problems will be solvable using online interpreters, local installation is optional

Operators

Operation	Symbol
Addition	+
Subtraction	-
Multiplication	*
Division	/ or //
Exponentiation	**
Modulo	%

Rules of precedence

1. Expressions between parentheses
2. Exponentiation
3. Multiplication, Division, Modulus (*)
4. Addition, Subtraction (*)

(*) From left to right

Why parentheses

- What is the sequence of operations?

$$Z = p * r \% q + w / x - y$$

$$Z = a * x ** 2 + b * x + c$$

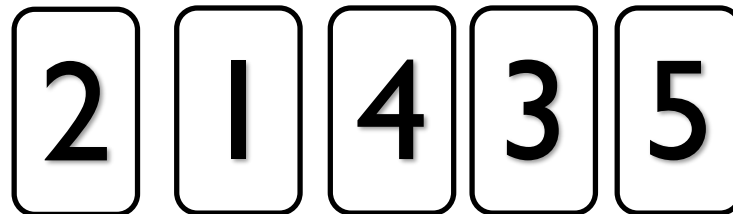
Why parentheses

- What is the sequence of operations?

$$Z = p * r \% q + w / x - y$$



$$Z = a * x ** 2 + b * x + c$$



Why parentheses

- Parentheses can help the readability

$$Z = ((p * r) \% q) + (w/x) - y$$

1 2 4 3 5

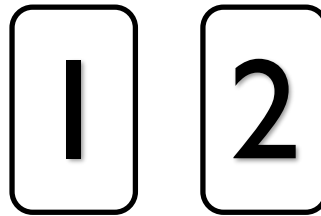
$$Z = (a * (x ** 2)) + (b * x) + c$$

2 1 4 3 5

Why parentheses

- Parentheses can change order of execution

$$Z = a * b + c$$



$$Z = a * (b + c)$$



Questions?

Comments

- Text that is not executed
 - Useful for explaining what the code does
 - Helps with code maintenance
 - When other people are involved
 - When you must come back to the same code after a long time
 - Code handed over for assignments must be clearly commented

Comments

```
c = float(input())
```

```
f = 9 * c / 5 + 32
```

```
print(f)
```

Comments

```
#This code converts an input temperature in C to F
```

```
#User input in C
```

```
c = float(input())
```

```
#Converting C to F
```

```
f=(9*c/5)+32
```

```
#Displaying result in F
```

```
print(f)
```

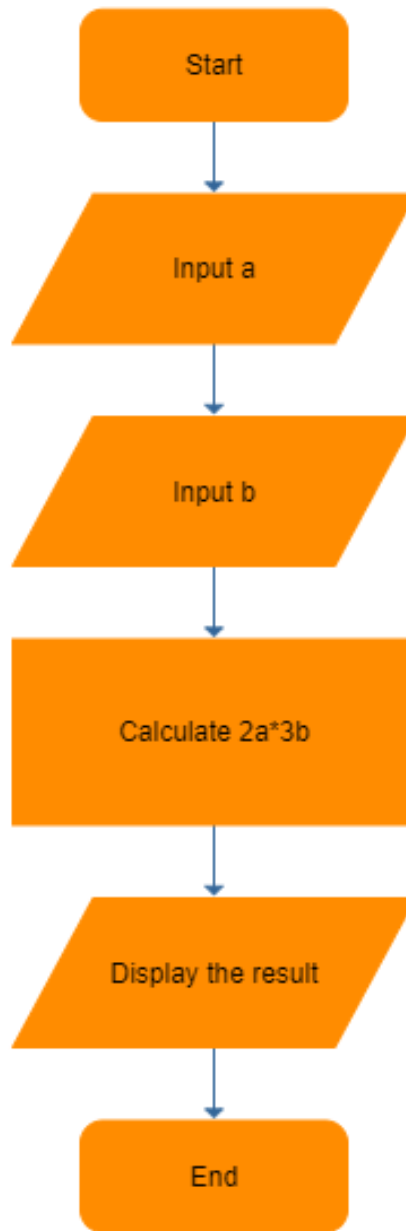
Questions?

Designing a program

- Write a program that asks the user to input a value for a and b, and outputs the result of $2a*3b$

Designing a program

- Pseudocode
 - Input a
 - Input b
 - Calculate $2a*3b$
 - Display the result



Writing the program

- Write a program that asks the user to input a value for a and b, and outputs the result of $2a*3b$

Writing the program

```
#This code calculates the value of 2a*3b
```

```
#Get user input
```

```
a = int(input("Please enter the value for a: "))
```

```
b = int(input("Please enter the value for b: "))
```

```
#Calculating 2a*3b
```

```
result = (2*a)*(3*b)
```

```
#Displaying the results
```

```
print("The result is", result)
```

Questions?

Exercise 1

- Write a program that calculates the area of a rectangle, the user must input the length of both sizes. $A = b * h$

Exercise 1

- Pseudocode
 - Input b
 - Input h
 - Calculate $A = b * h$
 - Display the result

Exercise 1

#This code calculates the area of a rectangle given both sides

#Get user input

```
base = int(input("Please enter the length of the base of the  
rectangle: "))
```

```
height = int(input("Please enter the height of the rectangle: "))
```

#Calculating the area

```
area = base * height
```

#Displaying the results

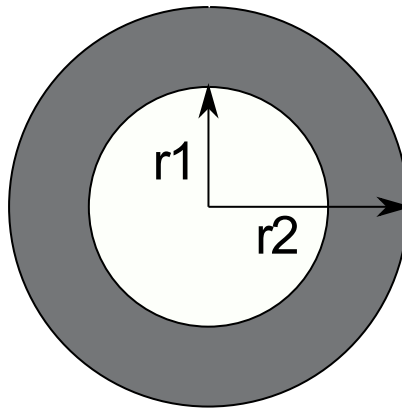
- ```
print("The area is", area)
```

# Questions?



# Exercise II

- Calculate the area of the ring formed by two circles (grey area) with radius  $r_1$  and  $r_2$  ( $r_2 > r_1$ ,  $\pi = 3.14$ ). Area of a circle is  $\pi r^2$



# Exercise 11

- Pseudocode
  - Input  $r_1$
  - Input  $r_2$
  - Calculate  $area_1$
  - Calculate  $area_2$
  - Calculate ring ( $area_2 - area_1$ )
  - Display result

# Exercise II

# The program calculates the area of a ring formed between two circles

# Getting user input for radius

```
r1 = int(input('Please enter the radius for the smaller circle: '))
```

```
r2 = int(input('Please enter the radius for the larger circle: '))
```

# Define pi as stated in problem description

```
pi = 3.14
```

# Calculate area of circles

```
area_1 = pi*(r1**2)
```

```
area_2 = pi*(r2**2)
```

# Calculate area of the ring

```
ring_area = area_2 - area_1
```

# Display results

```
print('The area of the ring is', ring_area)
```

# Questions?

# Exercise III

- Write a program that calculates the integer result and the remainder of the division between two integers inputted by a user. Tip: Remember the `//` operator

# Exercise III

```
This program calculates the result and remainder of a division of two integers
```

```
Get user input
```

```
numerator = int(input('Please enter the numerator of the division: '))
```

```
denominator = int(input('Please enter the denominator of the division: '))
```

```
Calculate result
```

```
result = numerator//denominator
```

```
Calculate remainder
```

```
remainder = numerator%denominator
```

```
Display result
```

```
print('The result is', result, 'and the remainder is', remainder)
```

# Questions?

# Exercise IV

- Write a program that calculates the  $y$  value for second degree polynomial where the user inputs,  $a$ ,  $b$ ,  $c$ , and  $x$ . ( $y = ax^2 + bx + c$ )



# Exercise IV

# This program calculates the y value for a second degree polynomial at a given point, with parameters inputed by the user

# Get parameters from user

a = int(input('Please input a: '))

b = int(input('Please input b: '))

c = int(input('Please input c: '))

x = int(input('Please input the point where the function must be evaluated: '))

# Calculate y for the input parameters

y = a\*x\*\*2+b\*x+c

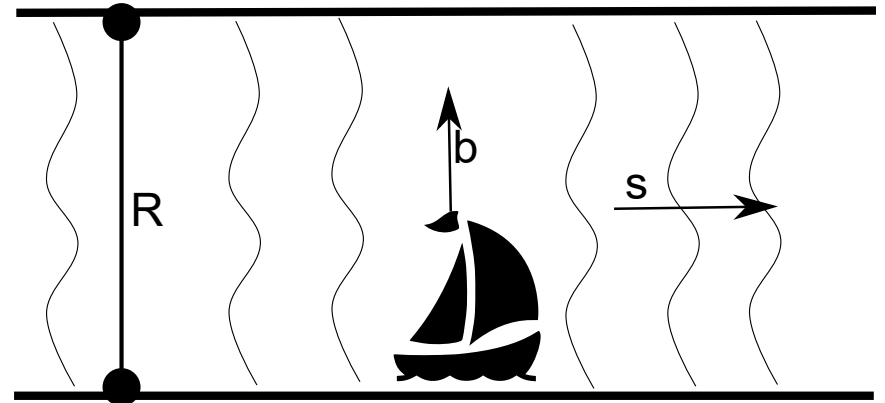
# Display the result

print('The result at the given point is', y)

# Questions?

# Exercise V

- Write a program that calculates how much the stream of a river will push a boat forward. The length of the river  $R$ , speed of the boat  $b$  and speed of the stream  $s$  are inputted by the user.



# Exercise V

- Pseudocode
  - Input  $R, b, s$
  - Calculate time boat takes to reach other side
  - Calculate length stream pushes boat for the calculated time
  - Display result

# Exercise V

# This program calculates how far a stream can push a boat in a river, given the distance between margins, the speed of the boat and the speed of the stream

```
river_lenght = int(input('Please enter the distance between the margins of the river: '))
boat_speed = int(input('Please enter the speed of the boat: '))
stream_speed = int(input('Please enter the speed of the stream: '))
```

# Calculate how long the boat takes to cross the river

```
cross_time = river_lenght / boat_speed
```

# Calculate how far the stream can push the boat

```
push_length = cross_time*stream_speed
```

# Display the results

```
print('The boat will be pushed', push_length, 'meters')
```

# Questions?

# Fim