



Workshop

Week 37

Exercise 1

Write a program that draws a random number (integer) between a lower and upper bound.

The program should:

- prompt the user for a lower and upper bound.
 - check that the user-supplied values are valid.
 - draw and display the random number to the user.
1. Find a function that draws a random number. Use Google! Hint: google «Python draw random integer».
 2. Write the program and use **if-else** statements to check that the inputs are valid.
 3. Modify the code so that it instead uses a **try-except** statement to avoid the program breaking if the user-supplied inputs are not valid.

Exercise 2

FOR14 students who want to sit in the final exam must complete all practice assignments given throughout the semester.

Write a program that:

- prompts a student for the number of assignments during the semester and the number of assignments that the student has completed.
 - checks that the user-supplied inputs are valid, i.e. non-negative inputs and no more submissions than total assignments.
 - displays a message confirming if the student is allowed to sit in the final exam or not.
1. Write an algorithm for the solution using nested **if-else** statements.
 2. Implement the solution using Python.
 3. Modify the code so that it now uses **if-elif** statements instead.

Exercise 2

Solution proposal for pseudocode:

Input: totAssignment, numComplete

Output: sit or not sit

```
if totAssignments < 0 or numComplete < 0 then
    Print «You cannot enter negative numbers!»
else
    if numComplete > totAssignments then
        Print «You cannot have more submissions than assignments!»
    else
        if numComplete = totAssignments then
            Print «You can take final exam»
        else
            Print «You cannot take the final exam»
        end if
    end if
end if
end if
```

Exercise 3

The prisoner's dilemma is a common example used in game theory. One example of the game is found in the table below.

Prisoner A \ Prisoner B	Prisoner B stays silent (<i>cooperates</i>)	Prisoner B betrays (<i>defects</i>)
	Prisoner A stays silent (<i>cooperates</i>)	Prisoner A betrays (<i>defects</i>)
Prisoner A stays silent (<i>cooperates</i>)	Each serves 1 year	Prisoner A: 3 years Prisoner B: goes free
Prisoner A betrays (<i>defects</i>)	Prisoner A: goes free Prisoner B: 3 years	Each serves 2 years

Write a program that implements the game. The program should:

- prompt the user for two inputs – choices of prisoners A and B (confess or stay silent).
- print the outcome of the game – prison sentences of prisoners A and B.

1. Write an algorithm for the solution using **if-elif** statements.
2. Implement the solution using Python.

Exercise 3

Solution proposal for algorithm:

Input: choiceA, choiceB

Output: prison sentences

```
if choiceA = confess and choiceB = confess then
    Print «You both get 2 years»
else if choiceA = confess and choiceB = stay silent then
    Print «Prisoner A gets 3 years, prisoner B goes free»
else if choiceA = stay silent and choiceB = confess then
    Print «Prisoner A goes free, prisoner B gets 3 years»
else
    Print «You both get 1 year»
end if
```



Exercise 4

Modify the temperature-conversion program from this week's class exercise so that it also converts temperatures in Kelvin. There are now three temperatures to convert from and to (Fahrenheit, Celsius and Kelvin), and we have the following formulas for conversion:

- $C = (F - 32) * 5 / 9$
- $K = (F - 32) * 5 / 9 + 273.15$
- $F = (9 / 5) * C + 32$
- $K = C + 273.15$
- $F = (9 / 5 * (K - 273.15)) + 32$
- $C = K - 273.15$

Write a program that prompts the user for a temperature, the scale to convert from, and the scale to convert to (for simplicity, the program should ignore checking that the user-supplied inputs are valid).

1. Write an algorithm for the solution using **nested if-elif** statements.
2. Implement the solution using Python.

Exercise 4

Input: temp, toScale, fromScale

Output: converted_temp

```
if fromScale = Fahrenheit then
    if toScale = Celsius then
        converted_temp = (temp - 32) * 5 / 9
    else if toScale = Kelvin then
        converted_temp = (temp - 32) * 5 / 9 + 273.15
    else
        converted_temp = temp
    end if
else if fromScale = Celsius then
    if toScale = Fahrenheit then
        converted_temp = (9 / 5 * temp) + 32
    else if toScale is Kelvin then
        converted_temp = temp + 273.15
    else
        converted_temp = temp
    end if
else
    if toScale is Fahrenheit then
        converted_temp = (9 / 5 * (temp - 273.15)) + 32
    else if toScale is Celsius then
        converted_temp = temp - 273.15
    else
        converted_temp = temp
    end if
end if
```

