PE01: PE of 07/11/2020 — Solutions

Master in Informatics and Computing Engineering
Programming Fundamentals
Instance: 2020/2021

An example of solutions for the 5 questions in this Practical on computer evaluation.

1. If odd or even

Write a Python script that receives three integers n1, n2 and n3 given by user input.
- If n1 is odd then the output is the product of n2 and n3.
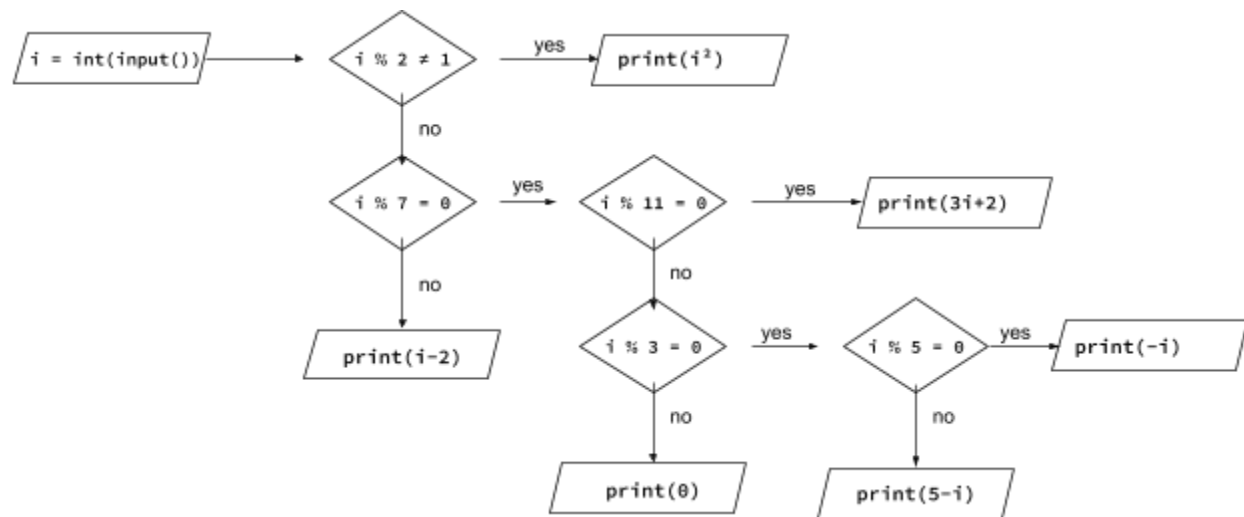- If n1 is even, then the output is the subtraction between n2 and n3.

Solution:

```python
n1 = int(input("n1? "))
n2 = int(input("n2? "))
n3 = int(input("n3? "))

if n1 % 2 != 0:
    print(n2*n3)
else:
    print(n2-n3)
```

2. Flowchart

Implement the following flowchart as a Python script:

Solution:

```python
i = int(input("i? "))

if i % 2 != 1:
    print(i**2)
elif i % 7 == 0:
    if i % 11 == 0:
        print(3*i+2)
    elif i % 3 == 0:
        if i % 5 == 0:
            print(-i)
        else:
            print(5-i)
    else:
        print(0)
else:
    print(i-2)
```

3. Volumes

Write a Python script that asks the user for a shape and all necessary parameters, then prints the volume of the shape, rounded to 1 decimals.

For example, if the user requests a cylinder, you must then ask for its radius and height.

The possible requested shapes, the shape's parameters, and corresponding output are the following:

Shape (str)	Parameters (float)	Output
"sphere"	radius (r)	$\frac{4}{3}\pi r^3$
"cylinder"	radius (r), height (h)	$\pi r^2 h$
"cone"	radius (r), height (h)	$\frac{1}{3}\pi r^2 h$

Solution:

```python
import math

shape = input("shape? ")
r = float(input("r? "))

if shape == 'sphere':
    result = (4/3)*math.pi*(r**3)
if shape == 'cylinder':
    h = float(input("h? "))
    result = math.pi*(r**2)*h
if shape == 'cone':
    h = float(input("h? "))
    result = (1/3)*math.pi*(r**2)*h

print(round(result, 1))
```

4. Multiplicative persistence

The *multiplicative persistence of a number* is the number of times the digits of a positive integer can be multiplied until the number has only one digit.

For example, the persistence of the number 39 is 3 because

$$39 \rightarrow 3*9 = 27 \rightarrow 2*7 = 14 \rightarrow 1*4 = 4.$$

Write a Python script that, given a number num by user input, prints out its multiplicative persistence.

Solution:

```python
num = int(input("num? "))

count = 0
while num > 9:
    aux = 1
    while num != 0:
        aux = (num % 10) * aux
        num = num // 10
    num = aux
    count += 1

print(count)
```

5. Only while and if

The upcoming Python XP is a new cleaned-up version and many flow control statements have been removed.

Modify the following code so that only while and if are used as flow control (i.e., you <u>cannot</u> use `for`, `elif`, `else`, `continue` or `break`).

```python
a = int(input())
b = int(input())

for i in range(a, b, 3):
    n = i
    if i**2 > (b/2)**2:
        break
    if i % 3 == 0 and i % 5 == 0:
        continue
    elif i % 2 == 0:
        for _ in range(3):
            n //= 2
    else:
        n += 1
    print(n)
```

Solution:

```python
a = int(input("a? "))
b = int(input("b? "))

i = a
while i < b and not (i**2 > (b/2)**2):
    n = i
    if not (i % 3 == 0 and i % 5 == 0):
        if i % 2 == 0:
            n //= 2
            n //= 2
            n //= 2
        if not (i % 2 == 0):
            n += 1
        print(n)
    i += 3
```

The end.