

Computer Programming

Python #1 – Easter

Background:

How variables are named is important. However, when working with any type of algorithm or formula that may be presented to you, it is always better to use the variable names used by the client. This reduces potential confusion that may arise if the client named something *ni* and you renamed it *netIncome*. This becomes quite clear in this assignment because if you try to change the names that are given, you would have to remember to translate from one variable name to the other and you would probably make a mistake.

A convenient algorithm for determining the date of Easter in a given year was devised in 1876 and first appeared in *Butcher's Ecclesiastical Handbook*. This algorithm holds for any year in the Gregorian calendar, which means years including and after 1583. Subject to minor adaptations, the algorithm is as follows:

Step	Code does this
1.	Let y be the year (such as 1583 or 2003).
2.	Divide y by 19 and call the remainder a . Ignore the quotient.
3.	Divide y by 100 and get a quotient b and a remainder c .
4.	Divide b by 4 and get a quotient d and a remainder e .
5.	Divide $b + 8$ by 25 and get a quotient f . Ignore the remainder.
6.	Divide $b - f + 1$ by 3 and get a quotient g . Ignore the remainder.
7.	Divide $19 * a + b - d - g + 15$ by 30 and get a remainder h . Ignore the quotient.
8.	Divide c by 4 and get a quotient i and a remainder k .
9.	Divide $32 + 2 * e + 2 * i - h - k$ by 7 and get a remainder r . Ignore the quotient.
10.	Divide $a + 11 * h + 22 * r$ by 451 and get a quotient m . Ignore the remainder.
11.	Divide $h + r - 7 * m + 114$ by 31 and get a quotient n and a remainder p .
12.	Add 1 to p .

The value of n gives the month (3 for March and 4 for April) and the value of p gives the day of the month.

Note: All of these variables should contain integers when finished. There are no floating point numbers in this assignment. As such, to find a quotient, use the `//` operator.

Assignment:

1. In your *Computer Programming* folder, create a folder titled *first_last_python_1*. Start IDLE. Create a new file. Save it in your *first_last_python_1* folder as *easter.py*.
2. Declare a variable called y and initialize it to 2003. Follow the algorithm in steps 2-12 above to calculate all of the other variables.
3. Now, write print statements so that the output of your code looks like this:

```
y = 2003
a = 8
b = 20
```

```
c = 3
d = 5
e = 0
f = 1
g = 6
h = 26
i = 0
k = 3
r = 3
m = 0
n = 4
p = 20
```

Easter in 2003 falls on 4/20

4. Create a text document called *output.txt* in your *first_last_python_1* folder. You will run your code 4 times with the following 4 values for *y*:

```
Run 1: 1776
Run 2: 1865
Run 3: 1999
Run 4: 2016
```

5. After each run, copy the output from your Python Shell window and paste it into the *output.txt* file.

Before you turn this assignment in, make sure that your *first_last_python_1* folder has 2 files:

1. *output.txt*
2. *easter.py*

Zip your *first_last_python_1* folder and turn it in in the usual manner.