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Caesar

tl;dr

Implement a program that encrypts messages using Caesar’s cipher, per the below.

```
$ python caesar.py 13
plaintext:  HELLO
ciphertext: URYYB
```

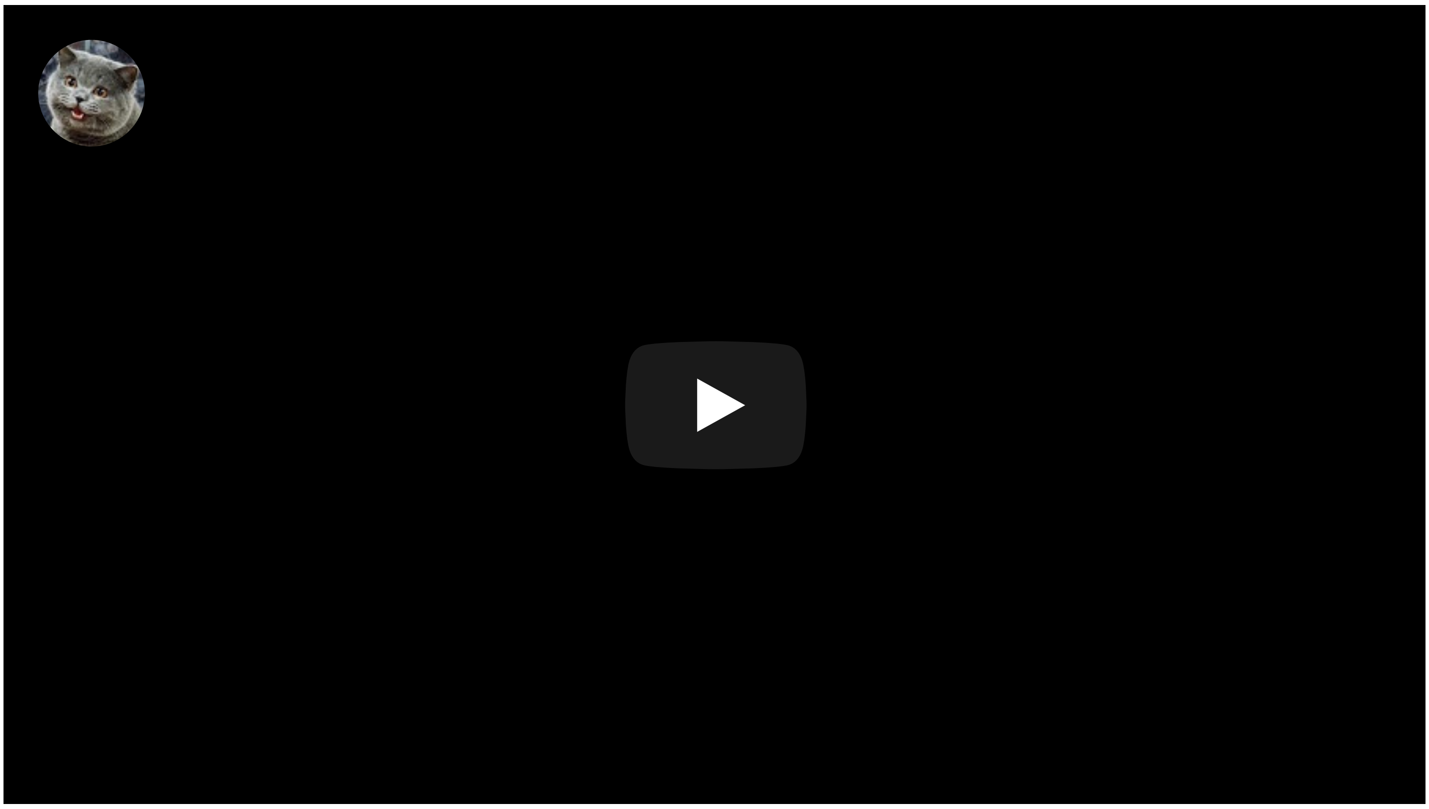
Specification

Design and implement a program, `caesar`, that encrypts messages using Caesar's cipher, exactly as you did in Problem Set 2 (https://lab.cs50.io/cs50/labs/2019/x/caesar/), except that your program this time should be written (a) in Python and (b) in CS50 IDE.

- Implement your program in a file called `caesar.py` in your `~/workspace/pset6/caesar` directory (if it doesn't already exist, create it now!).
- Your program must accept a single command-line argument, a non-negative integer. Let's call it *k* for the sake of discussion.
- If your program is executed without any command-line arguments or with more than one command-line argument, your program should print an error message of your choice (with `print`) and exit (https://docs.python.org/3/library/sys.html#sys.exit) immediately with a status code of 1.
- You can assume that, if a user does provide a command-line argument, it will be a non-negative integer (e.g., `1`). No need to check that it's indeed numeric.
- Do not assume that *k* will be less than or equal to 26. Your program should work for all non-negative integral values of *k* less than 2^{31} - 26. In other words, you don't need to worry if your program eventually breaks if the user chooses a value for *k* that's too big or almost too big to fit in an `int`. (Recall that an `int` can overflow.) But, even if *k* is greater than 26, alphabetical characters in your program's input should remain alphabetical characters in your program's output. For instance, if *k* is 27, `A` should not become `[` even though `[` is 27 positions away from `A` in ASCII, per asciichart.com (http://www.asciichart.com/); `A` should become `B`, since `B` is 27 positions away from `A`, provided you wrap around from `Z` to `A`.

- Your program must output `plaintext:` (without a newline) and then prompt the user for a `string` of plaintext (using `get_string`).
- Your program must output `ciphertext:` (without a newline) followed by the plaintext's corresponding ciphertext, with each alphabetical character in the plaintext "rotated" by *k* positions; non-alphabetical characters should be outputted unchanged.
- Your program must preserve case: capitalized letters, though rotated, must remain capitalized letters; lowercase letters, though rotated, must remain lowercase letters.
- After outputting ciphertext, you should print a newline.

Walkthrough



Usage

Your program should behave per the examples below. Assume that the underlined text is what some user has typed.

```
$ python caesar.py 1
plaintext:  HELLO
ciphertext: IFMMP
```

```
$ python caesar.py 13
plaintext:  hello, world
ciphertext: uryyb, jbeyq
```

```
$ python caesar.py 13
plaintext:  be sure to drink your Ovaltine
ciphertext: or fher gb qevax lbhe Binygvar
```

```
$ python caesar.py
Usage: python caesar.py k
```

```
$ python caesar.py 1 2 3 4 5
Usage: python caesar.py k
```

Testing

Correctness

```
check50 cs50/problems/2019/x/sentimental/caesar
```

Style

```
style50 caesar.py
```

Staff's Solution

```
~cs50/2019/x/pset6/caesar
```

How to Submit

Execute the below, logging in with your GitHub username and password when prompted. For security, you'll see asterisks (`*`) instead of the actual characters in your password.

```
submit50 cs50/problems/2019/x/sentimental/caesar
```

You can then go to https://cs50.me/cs50x (https://cs50.me/cs50x) to view your current scores!

Hints

Recall that `argv` is a list of strings representing the command line arguments. Recall that we can use `len(argv)` in order to figure out how many strings exist in that list; this is the equivalent idea to `argc`, from C.

And so you can access *k* with code like

```
k = argv[1]
```

assuming it’s actually there! And assuming you’ve imported `argv`, as by:

```
from sys import argv
```

Once you have both `k` and some plaintext, `p`, it’s time to encrypt the latter with the former. Recall that you can iterate over the characters in a string, printing each one at a time, with code like the below:

```
for c in p:
    print(c, end="")
```

That `end=""` line just overrides Python’s default behavior when printing which, unlike C, tacks on a newline by default!

You may also wish to have a look at Python’s `ord()` and `chr()` functions!