CS50's Introduction to Programming with Python

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CS50 P-Shirt

After finishing CS50 itself, students on campus at Harvard traditionally receive their very own I took CS50 (https://cs50.harvardshop.com/collections/print/products/i-took-cs50-unisex-t-shirt) t-shirt. No need to buy one online, but like to try one on virtually?

In a file called `shirt.py`, implement a program that expects exactly two command-line arguments:

- in `sys.argv[1]`, the name (or path) of a JPEG or PNG to read (i.e., open) as input
- in `sys.argv[2]`, the name (or path) of a JPEG or PNG to write (i.e., save) as output

The program should then overlay shirt.png (which has a transparent background) on the input after resizing and cropping the input to be the same size, saving the result as its output.

Open the input with `Image.open`, per pillow.readthedocs.io/en/stable/reference/Image.html#PIL.Image.open (https://pillow.readthedocs.io/en/stable/reference/Image.html#PIL.Image.open), resize and crop the input with `ImageOps.fit`, per pillow.readthedocs.io/en/stable/reference/ImageOps.html#PIL.ImageOps.fit (https://pillow.readthedocs.io/en/stable/reference/ImageOps.html#PIL.ImageOps.fit), using default values for `method`, `bleed`, and `centering`, overlay the shirt with `Image.paste`, per pillow.readthedocs.io/en/stable/reference/Image.html#PIL.Image.Image.paste (https://pillow.readthedocs.io/en/stable/reference/Image.html#PIL.Image.Image.paste), and save the result with `Image.save`, per pillow.readthedocs.io/en/stable/reference/Image.html#PIL.Image.Image.save (https://pillow.readthedocs.io/en/stable/reference/Image.html#PIL.Image.Image.save).

The program should instead exit via `sys.exit`:

- if the user does not specify exactly two command-line arguments,
- if the input's and output's names do not end in `.jpg`, `.jpeg`, or `.png`, case-insensitively,
- if the input's name does not have the same extension as the output's name, or
- if the specified input does not exist.

Assume that the input will be a photo of someone posing in just the right way, like these demos, so that, when they're resized and cropped, the shirt appears to fit perfectly.

If you'd like to run your program on a photo of yourself, first drag the photo over to VS Code's file explorer, into the same folder as `shirt.py`. No need to submit any photos with your code. But, if you would like, you're welcome (but not expected) to share a photo of yourself wearing your virtual shirt in any of CS50's communities (https://cs50.harvard.edu/python/communities)!

▶ **Hints**

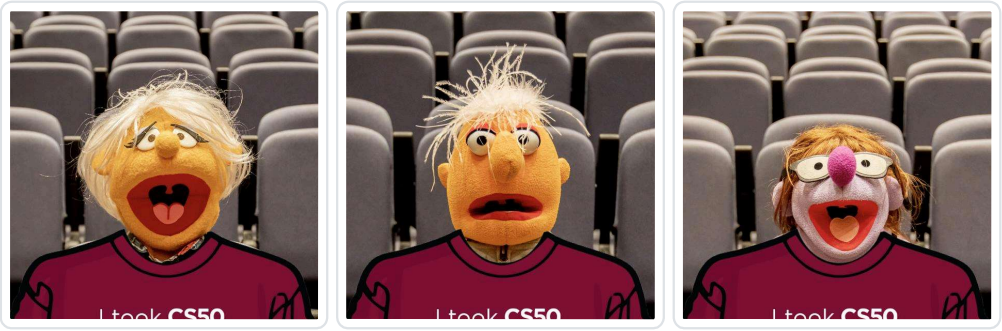
Demo

```
$ python shirt.py
Too few command-line arguments
$ python shirt.py foo
Too few command-line arguments
$ python shirt.py foo bar
Invalid input
$ python shirt.py foo bar baz
Too many command-line arguments
$ python shirt.py before.jpg after.png
Input and output have different extensions
$ python shirt.py before.jpg after.jpg
$ python shirt.py before.png
```

Recorded with **asciinema**

Before

After



Before You Begin

Log into cs50.dev (https://cs50.dev/), click on your terminal window, and execute `cd` by itself. You should find that your terminal window's prompt resembles the below:

```
$
```

Next execute

```
mkdir shirt
```

to make a folder called `shirt` in your codespace.

Then execute

```
cd shirt
```

to change directories into that folder. You should now see your terminal prompt as `shirt/ $`. You can now execute

```
code shirt.py
```

to make a file called `shirt.py` where you'll write your program. Be sure to run

```
wget https://cs50.harvard.edu/python/2022/psets/6/shirt/shirt.png
```

to download shirt.png. Also be sure to run

```
wget https://cs50.harvard.edu/python/2022/psets/6/shirt/muppets.zip
```

to download muppets.zip into your folder. You can run

```
unzip muppets.zip
```

to extract a collection of muppet photos!

How to Test

Here's how to test your code manually:

- Run your program with `python shirt.py`. Your program should exit using `sys.exit` and provide an error message:

  ```
  Too few command-line arguments
  ```

- Be sure to download muppets.zip and extract a collection of muppet photos using `unzip muppets.zip`. Run your program with `python shirt.py before1.jpg before2.jpg before3.jpg`. Your program should output:

  ```
  Too many command-line arguments
  ```

- Run your program with `python shirt.py before1.jpg invalid_format.bmp`. Your program should exit using `sys.exit` and provide an error message:

```
Invalid output
```

- Run your program with `python shirt.py before1.jpg after1.png`. Your program should exit using `sys.exit` and provide an error message:

```
Input and output have different extensions
```

- Run your program with `python shirt.py non_existent_image.jpg after1.jpg`. Your program should exit using `sys.exit` and provide an error message:

```
Input does not exist
```

- Run your program with `python shirt.py before1.jpg after1.jpg`. Assuming you've downloaded and unzipped muppets.zip, your program should create an image like the below:

You can execute the below to check your code using `check50`, a program that CS50 will use to test your code when you submit. But be sure to test it yourself as well!

```
check50 cs50/problems/2022/python/shirt
```

Green smilies mean your program has passed a test! Red frownies will indicate your program output something unexpected. Visit the URL that `check50` outputs to see the input `check50` handed to your program, what output it expected, and what output your program actually gave.

How to Submit

In your terminal, execute the below to submit your work.

```
submit50 cs50/problems/2022/python/shirt
```