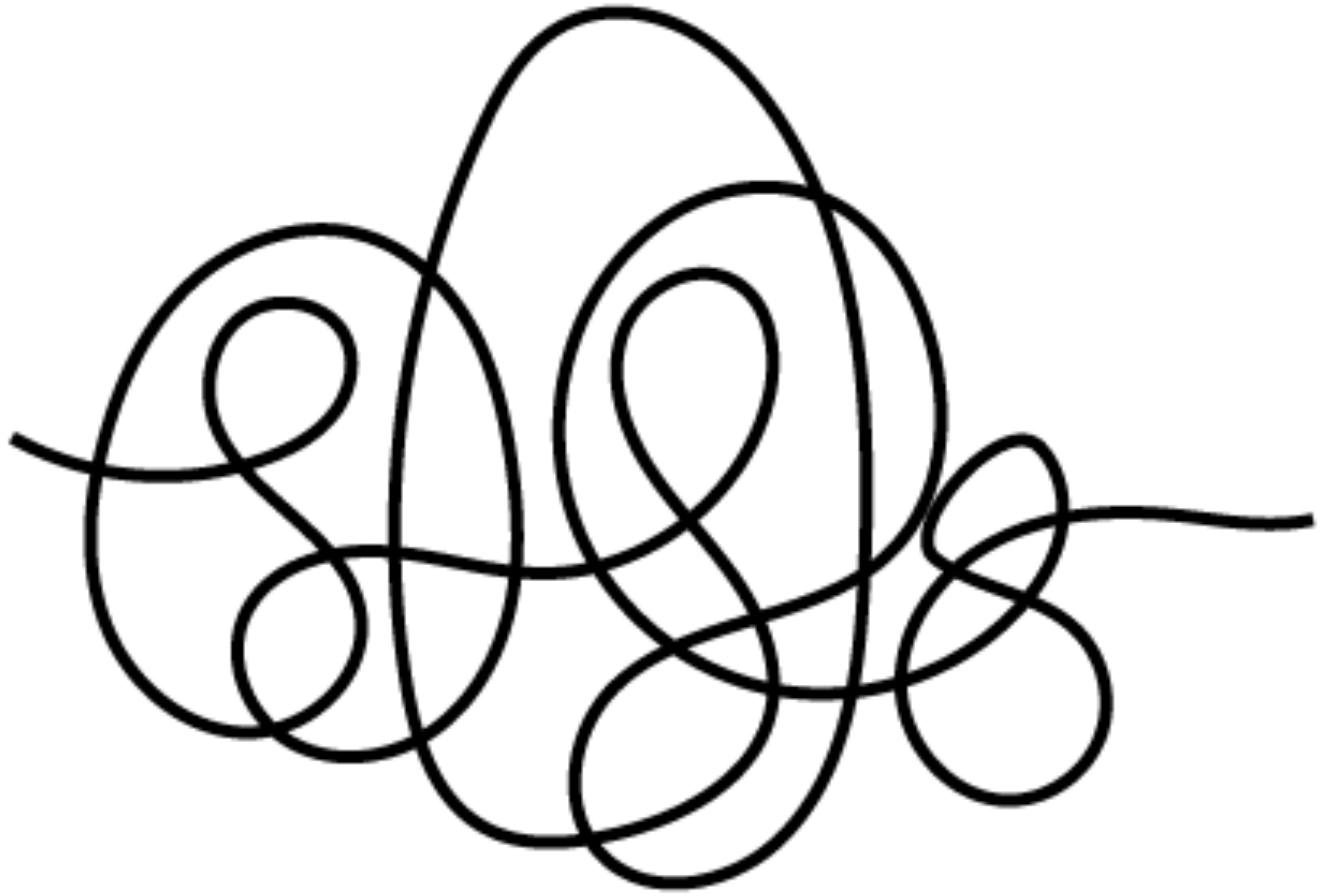
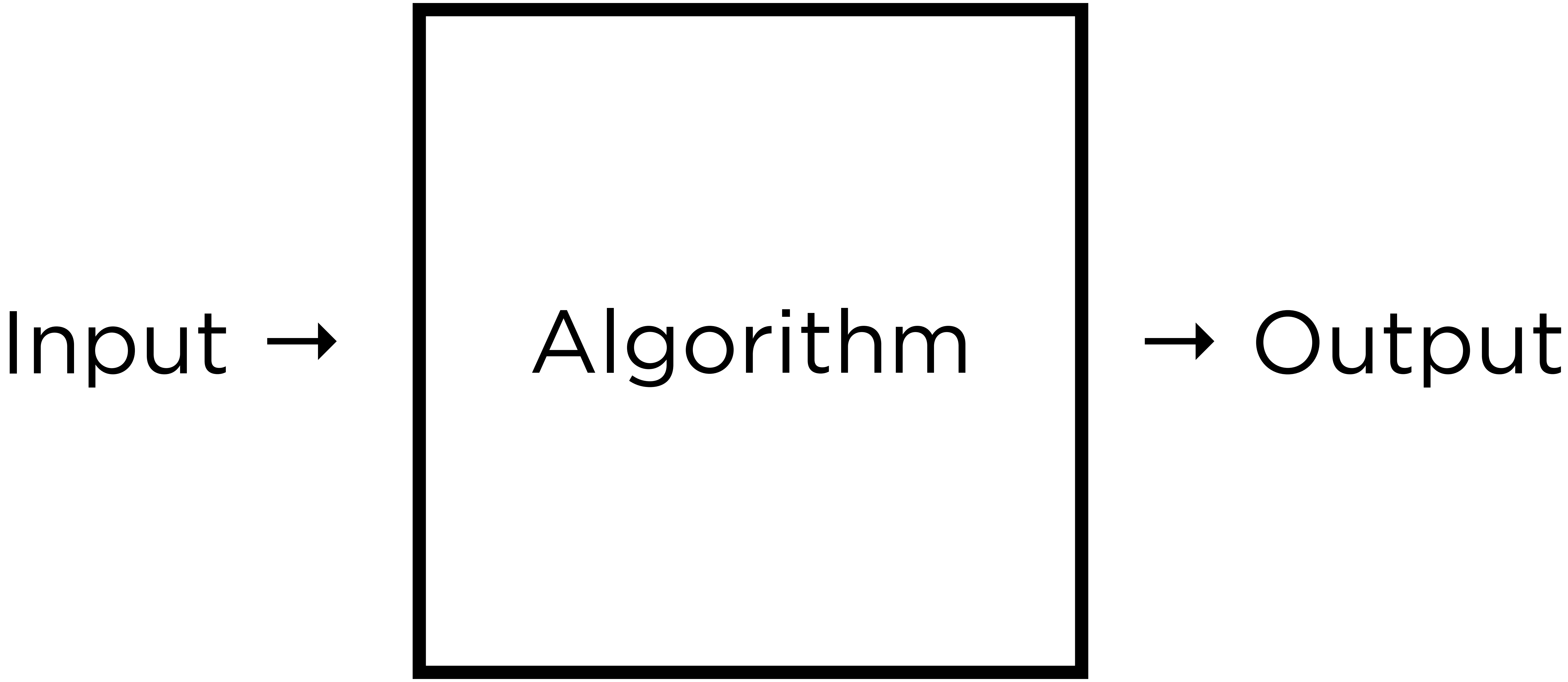


Python Lab

CS50 for Lawyers



Input → Algorithm → Output

- Work an example yourself
- Create an algorithm after working multiple examples
- Test your algorithm by hand
- Translate your algorithm to code
- Find bugs in your code by testing it

- Work an example yourself
- Create an algorithm after working multiple examples
- Test your algorithm by hand
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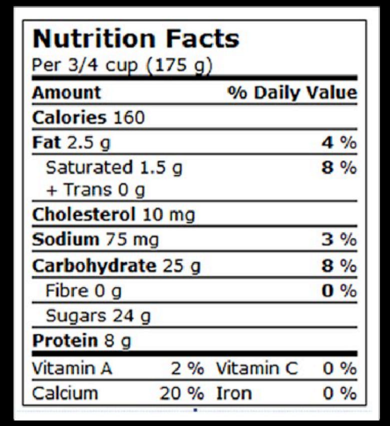
https://cs50.harvard.edu/hls/2023/winter/labs/0/

playback.py

faces.py

twttr.py

coke.py



Nutrition Facts	
Per 3/4 cup (175 g)	
Amount	**% Daily Value**
Calories 160	
Fat 2.5 g	**4 %**
Saturated 1.5 g + Trans 0 g	**8 %**
Cholesterol 10 mg	
Sodium 75 mg	**3 %**
Carbohydrate 25 g	**8 %**
Fibre 0 g	**0 %**
Sugars 24 g	
Protein 8 g	

Vitamin A	2 %	Vitamin C	0 %
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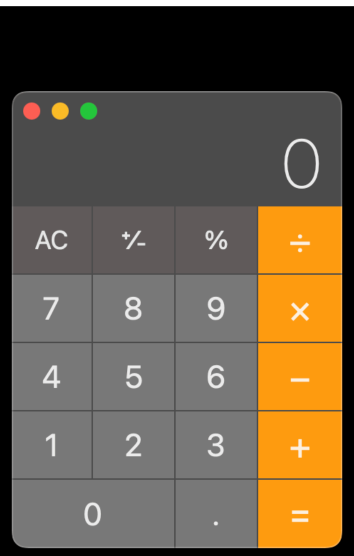
nutrition.py



calculator.py

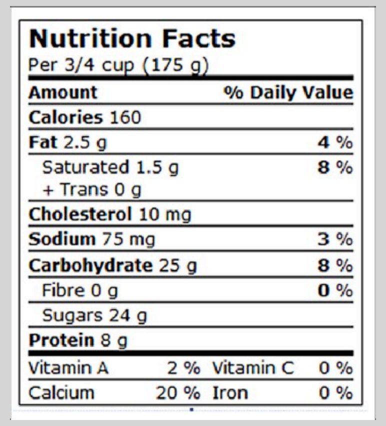
cases.py

playback.py

faces.py

twttr.py

coke.py



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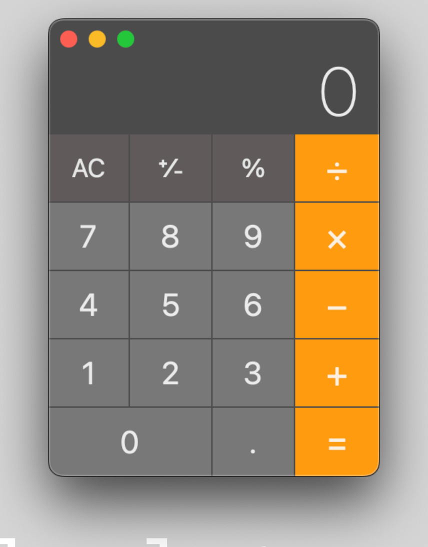


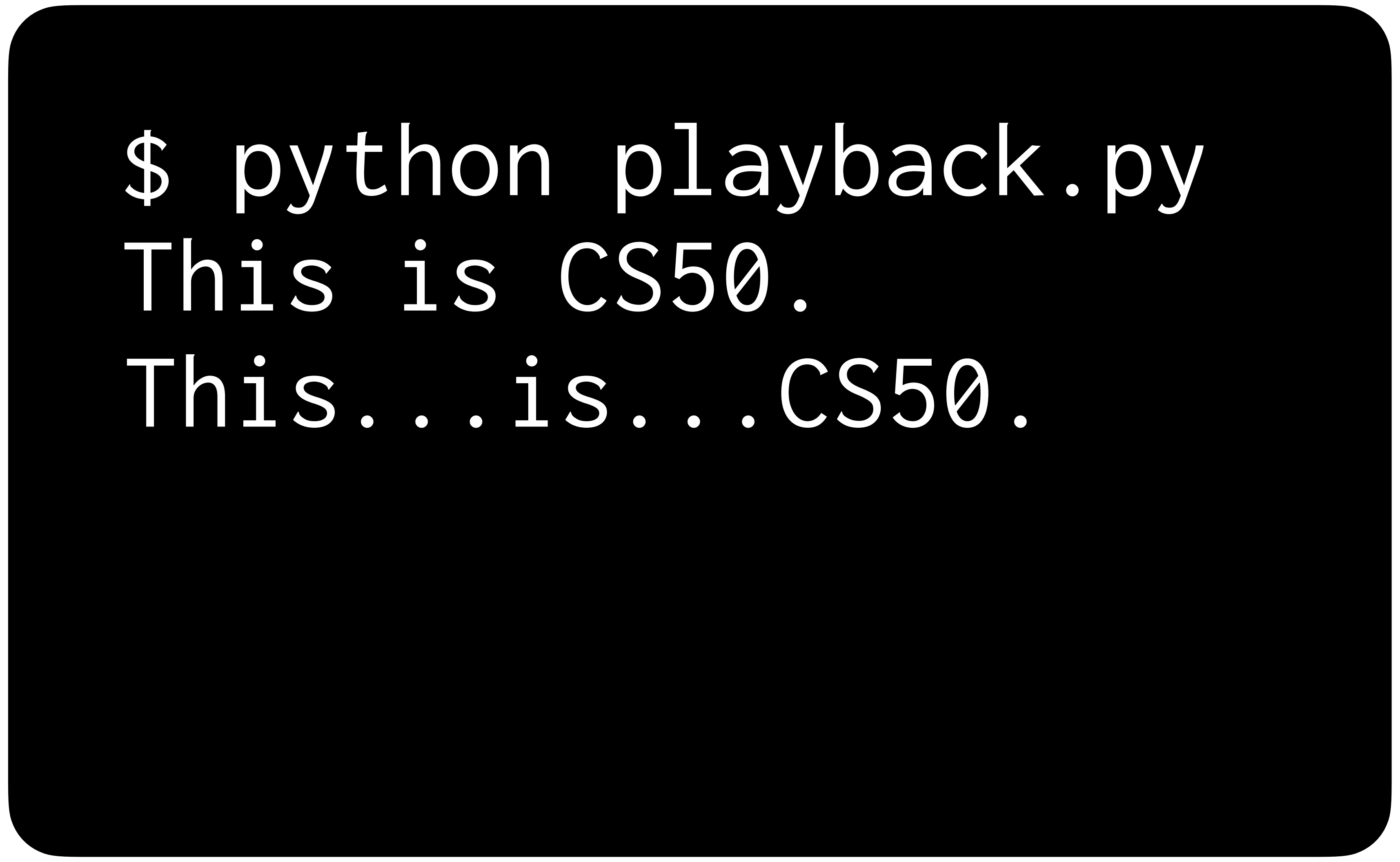
calculator.py

cases.py

▶

Playback

https://code.cs50.io/

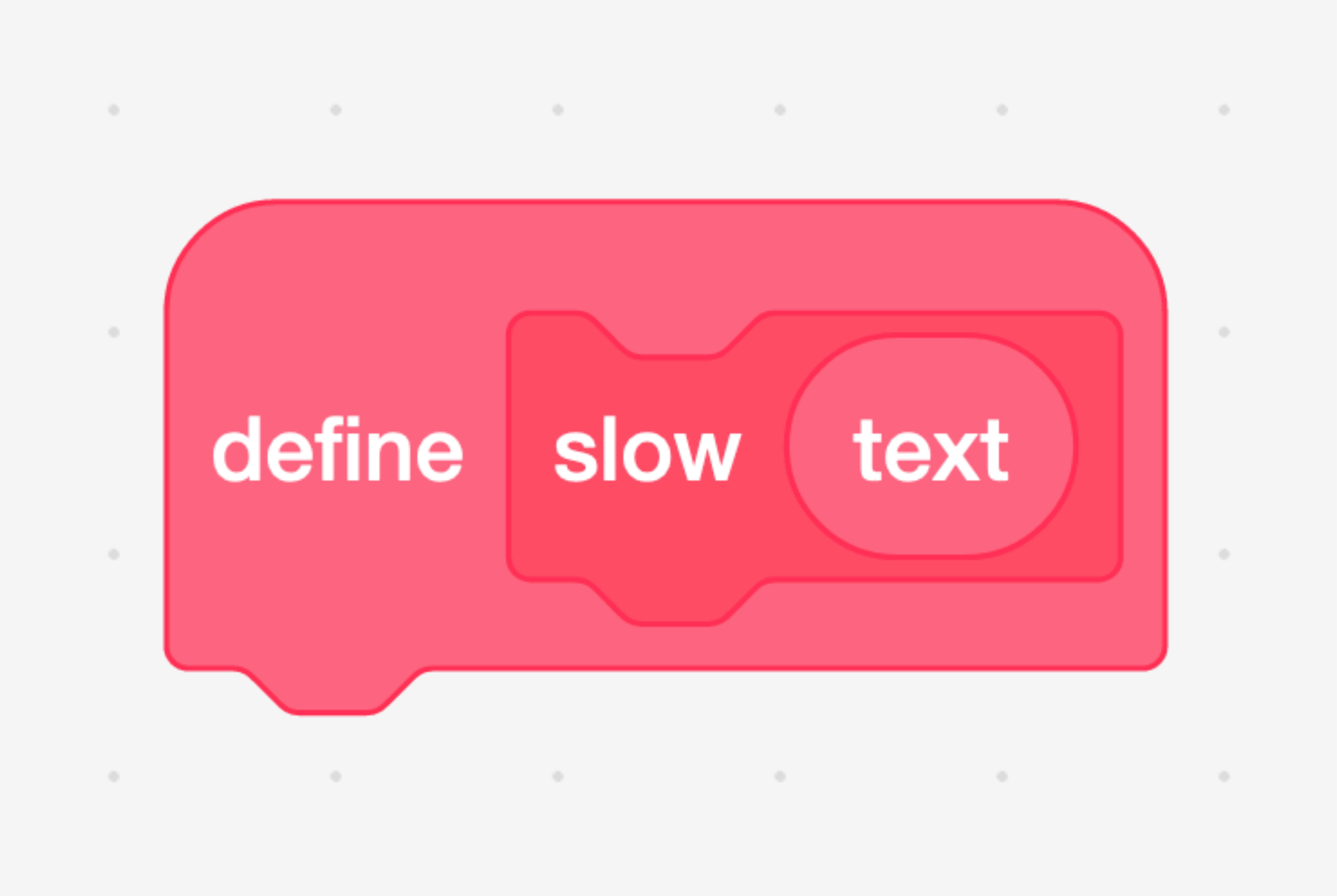


```
$ python playback.py
This is CS50.
This...is...CS50.
```

"This is CS50." → → "This...is...CS50."

https://docs.python.org/3/library/stdtypes.html

Abstraction



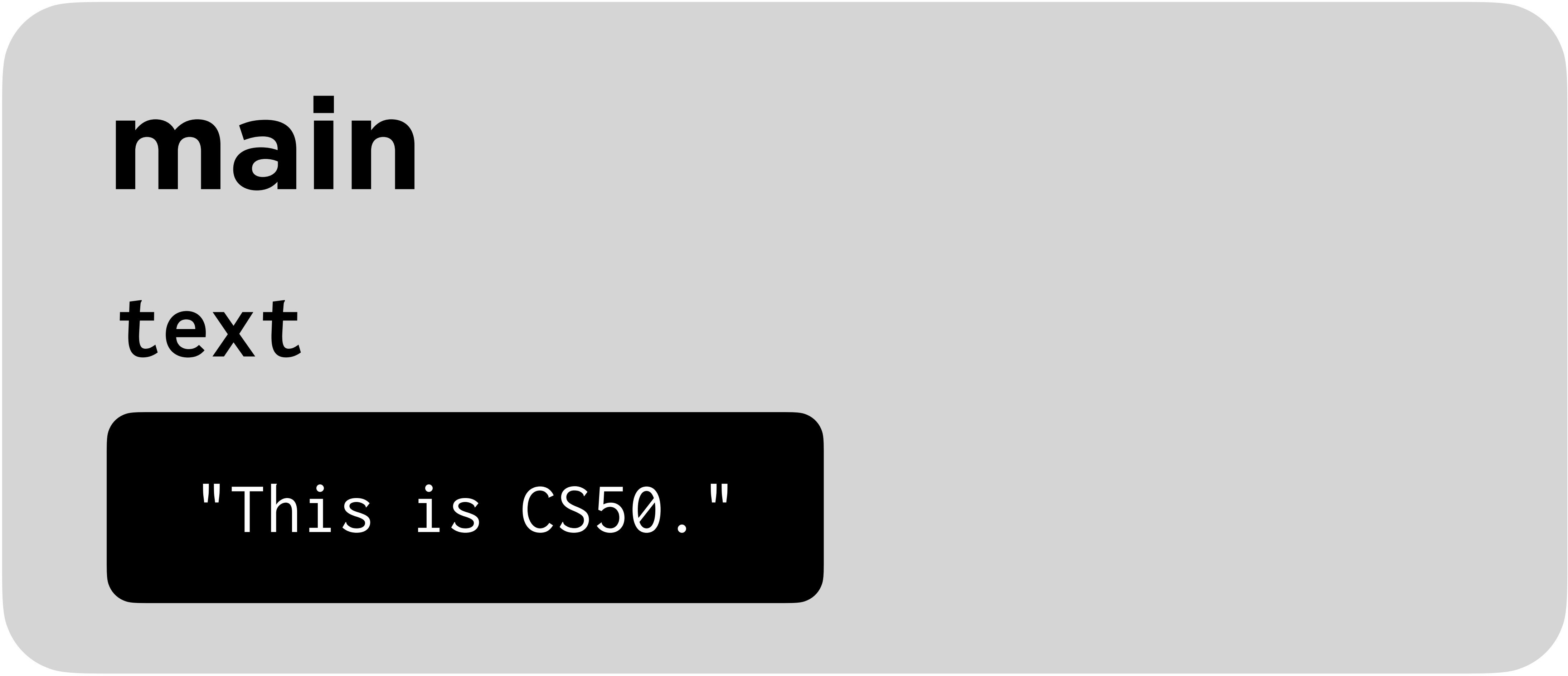
```
def slow(text):
    ...
```

Return Values

```
def main():
    text = input("")
    print(slow(text))

def slow(text):
    text.replace(" ", "...")

main()
```



main

text

"This is CS50."

```
def main():
    text = input("")
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def slow(text):
    text.replace(" ", "...")

main()
```

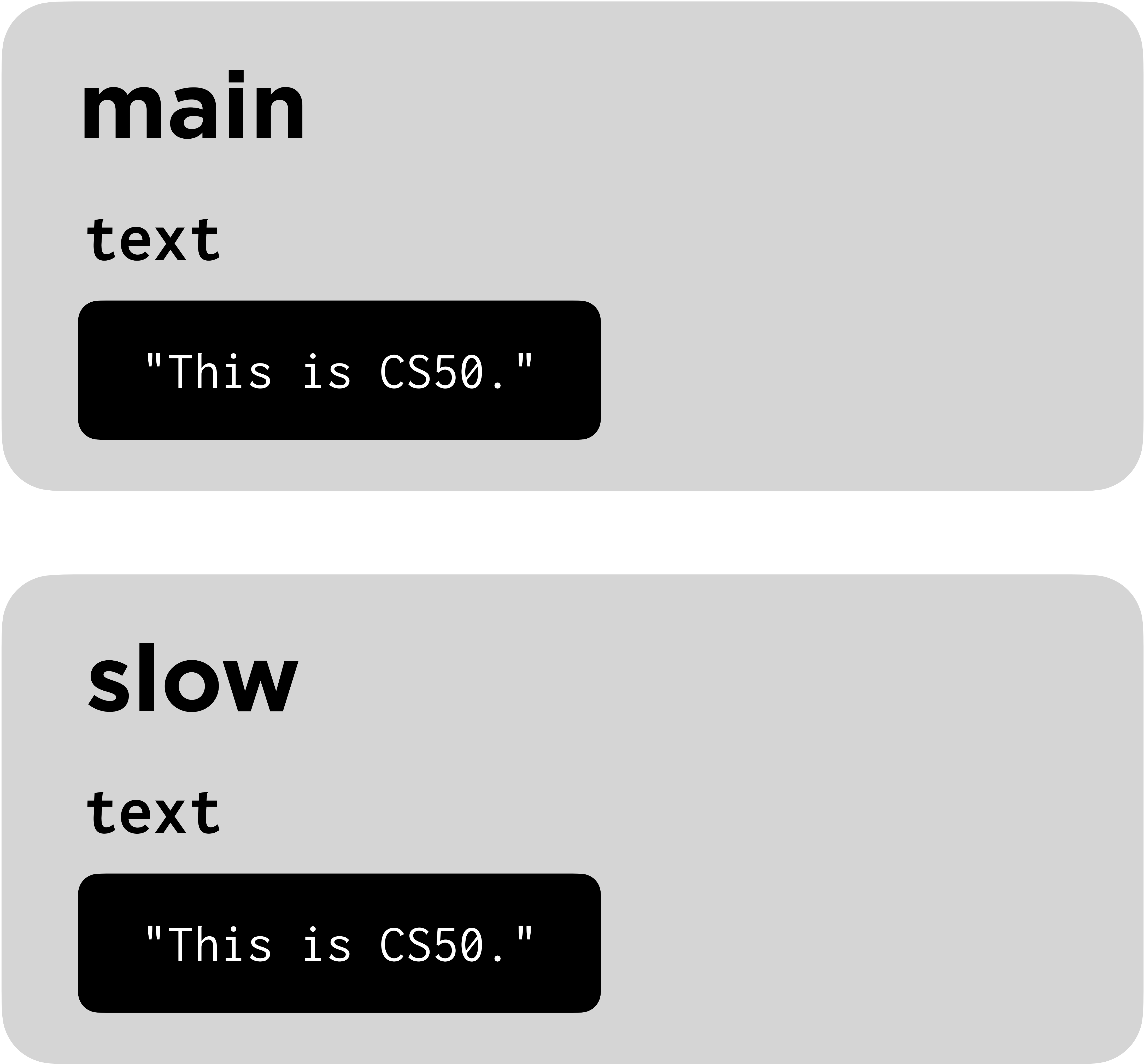

main

text

"This is CS50."

slow

text

"This is CS50."

```
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    text = input("")
    print(slow(text))

def slow(text):
    text.replace(" ", "...")

main()
```

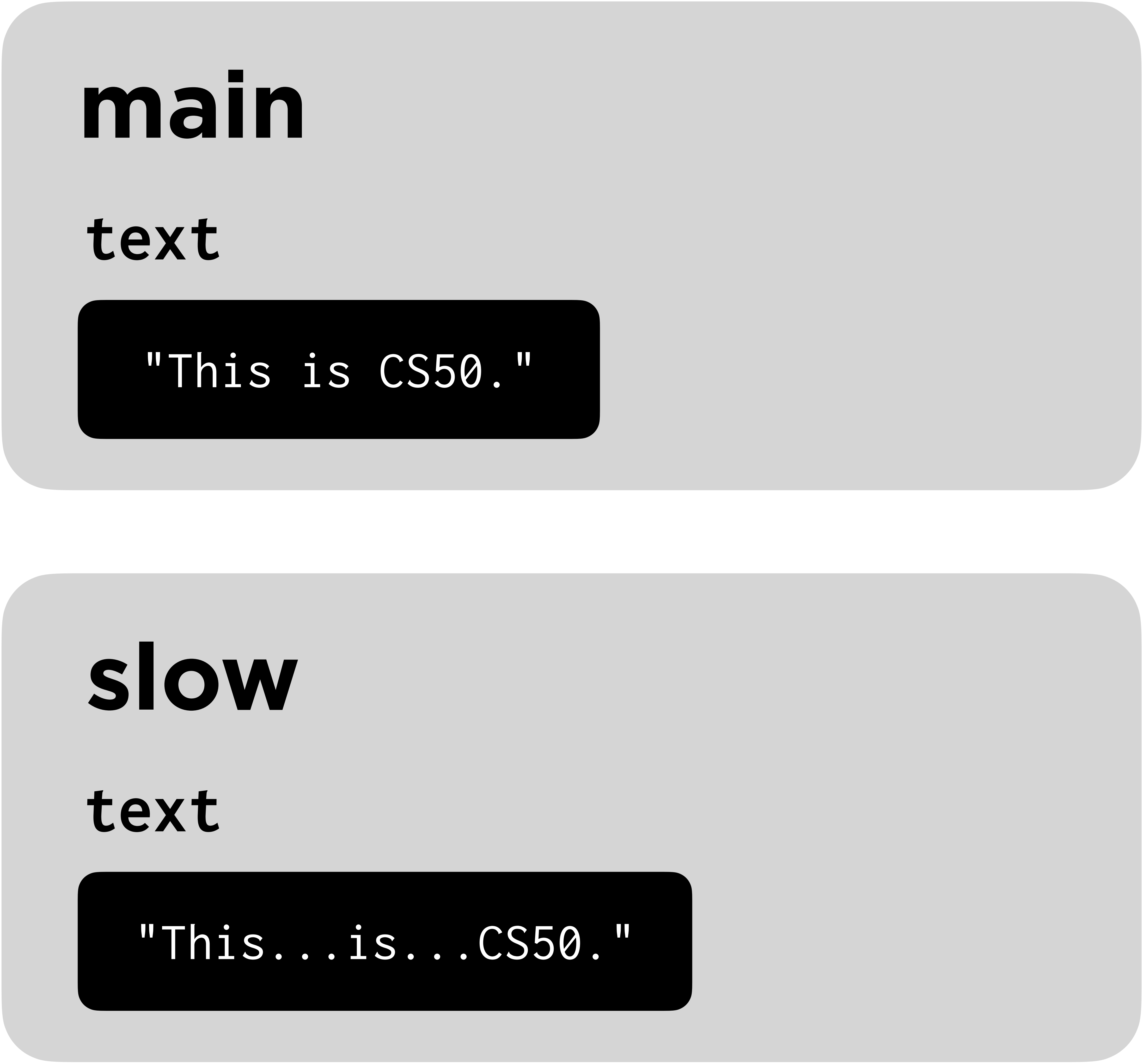

main

text

"This is CS50."

slow

text

"This...is...CS50."

```
def main():
    text = input("")
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def slow(text):
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main()
```

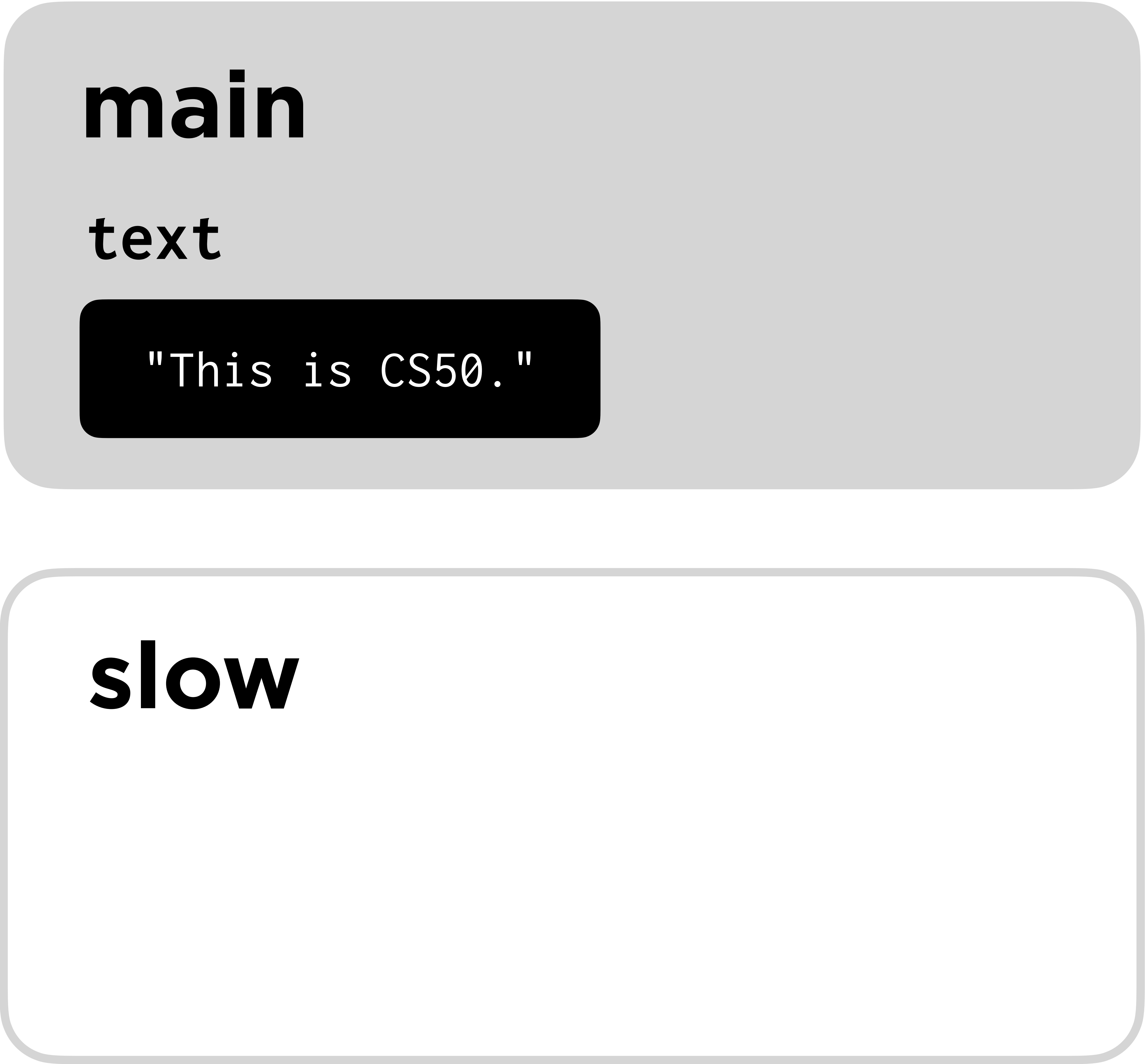

main

text

"This is CS50."

slow

```
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main()
```
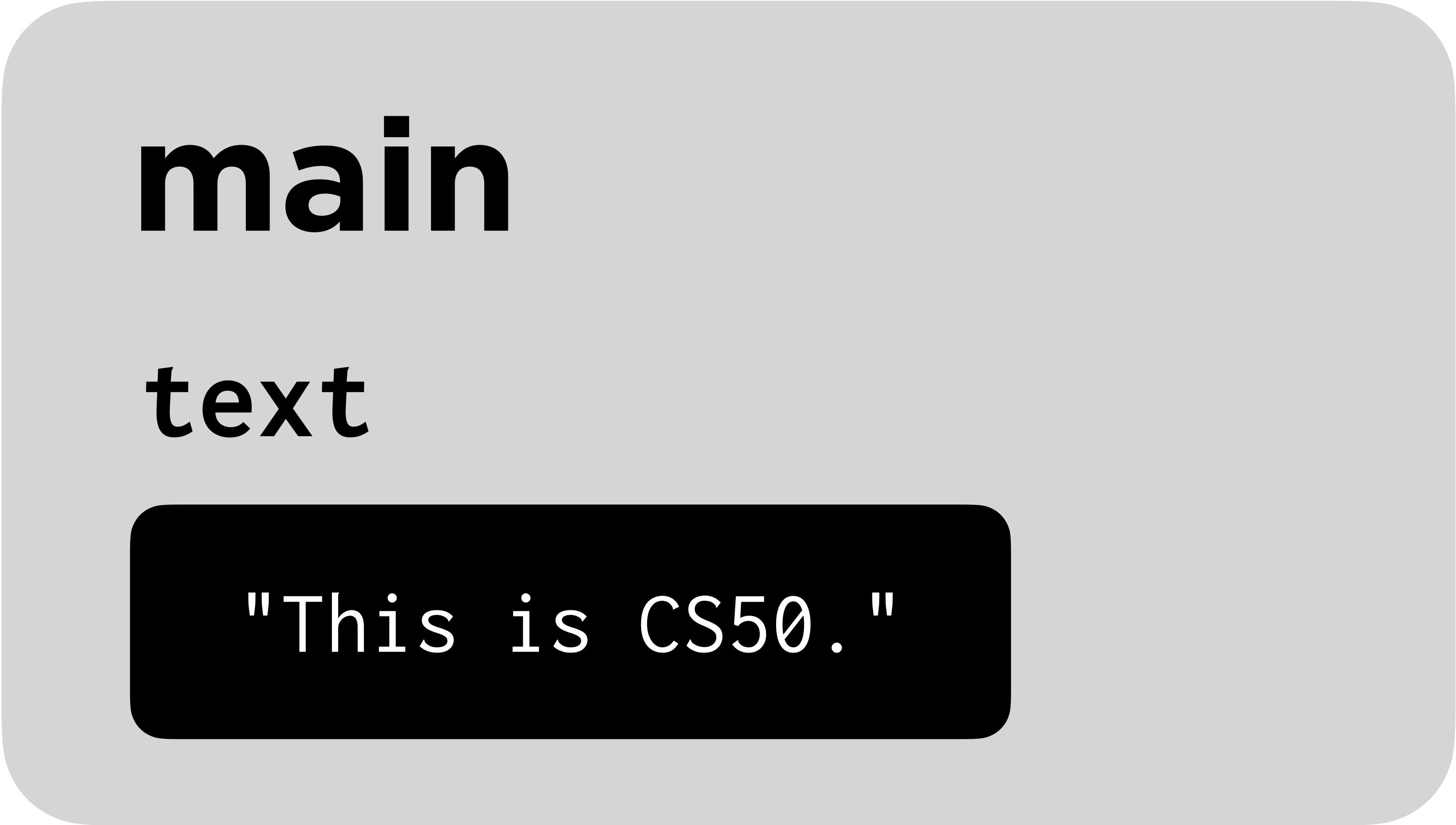
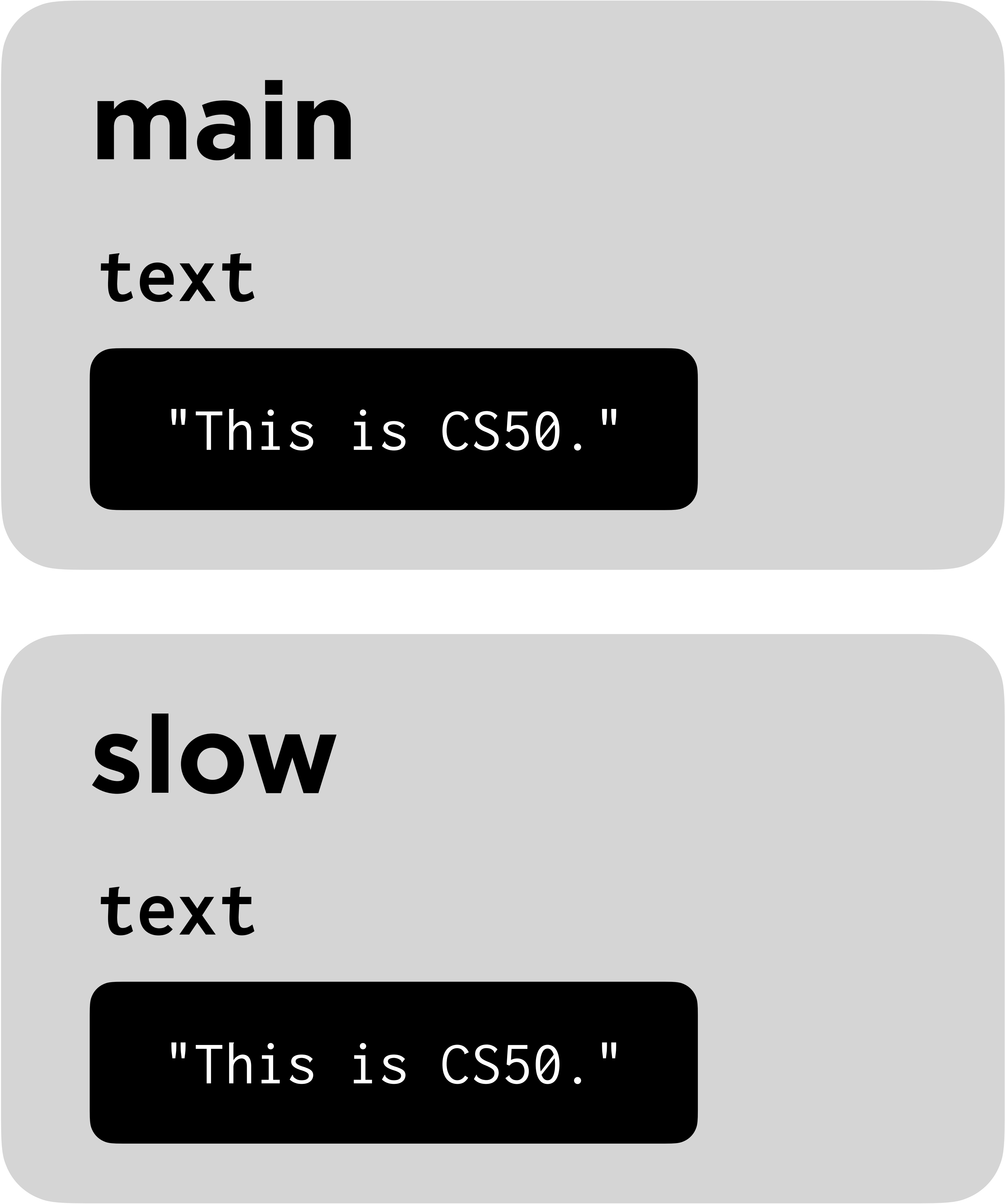



main

text

"This is CS50."

```python
def main():
    text = input("")
    print(slow(text))

def slow(text):
    return text.replace(" ", "...")

main()
```



main

text

"This is CS50."

slow

text

"This is CS50."

```python
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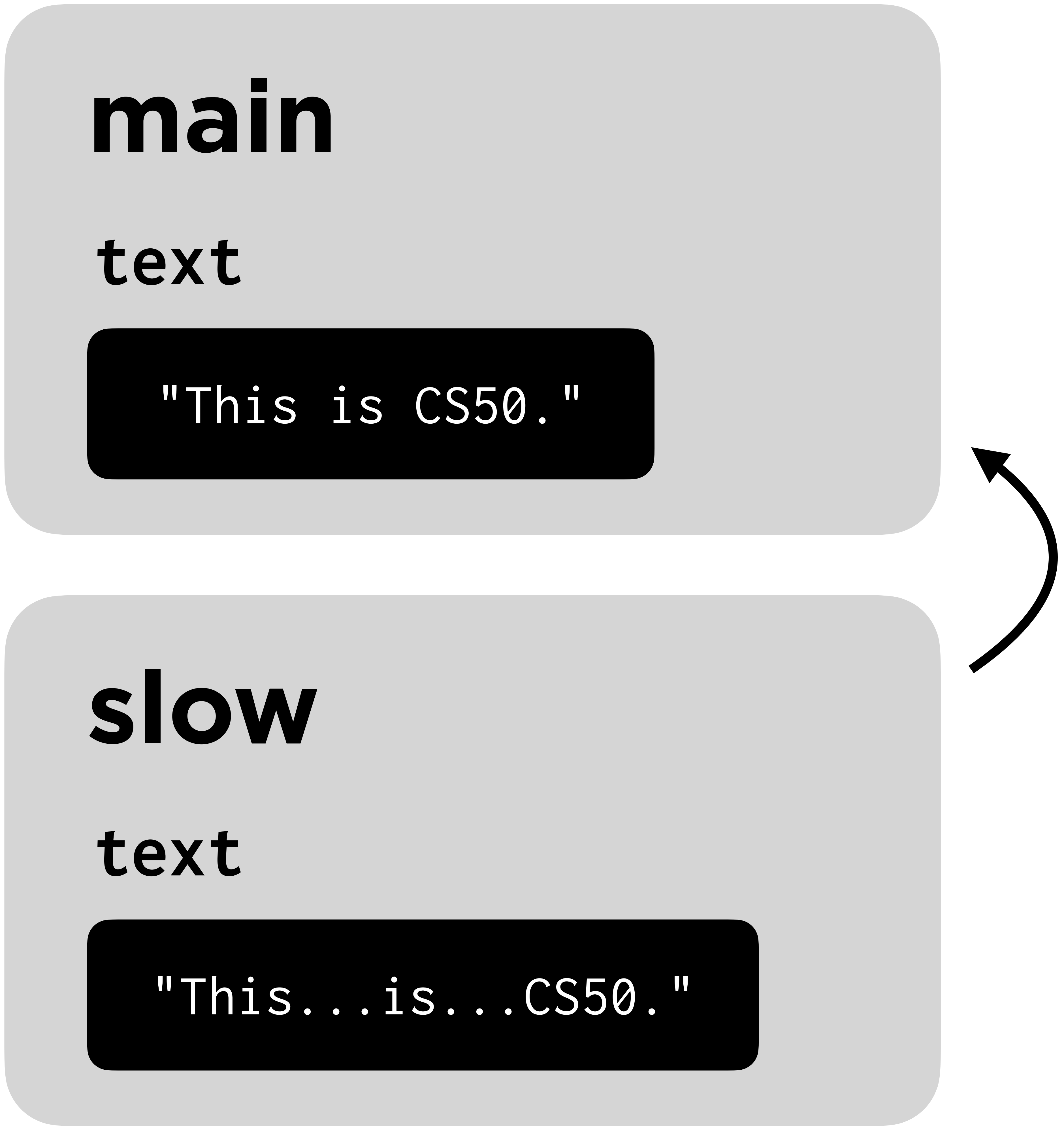
    text = input("")
    print(slow(text))

def slow(text):
    return text.replace(" ", "...")

main()
```



main

text

"This is CS50."

slow

text

"This...is...CS50."

```
def main():
    text = input("")
    print(slow(text))

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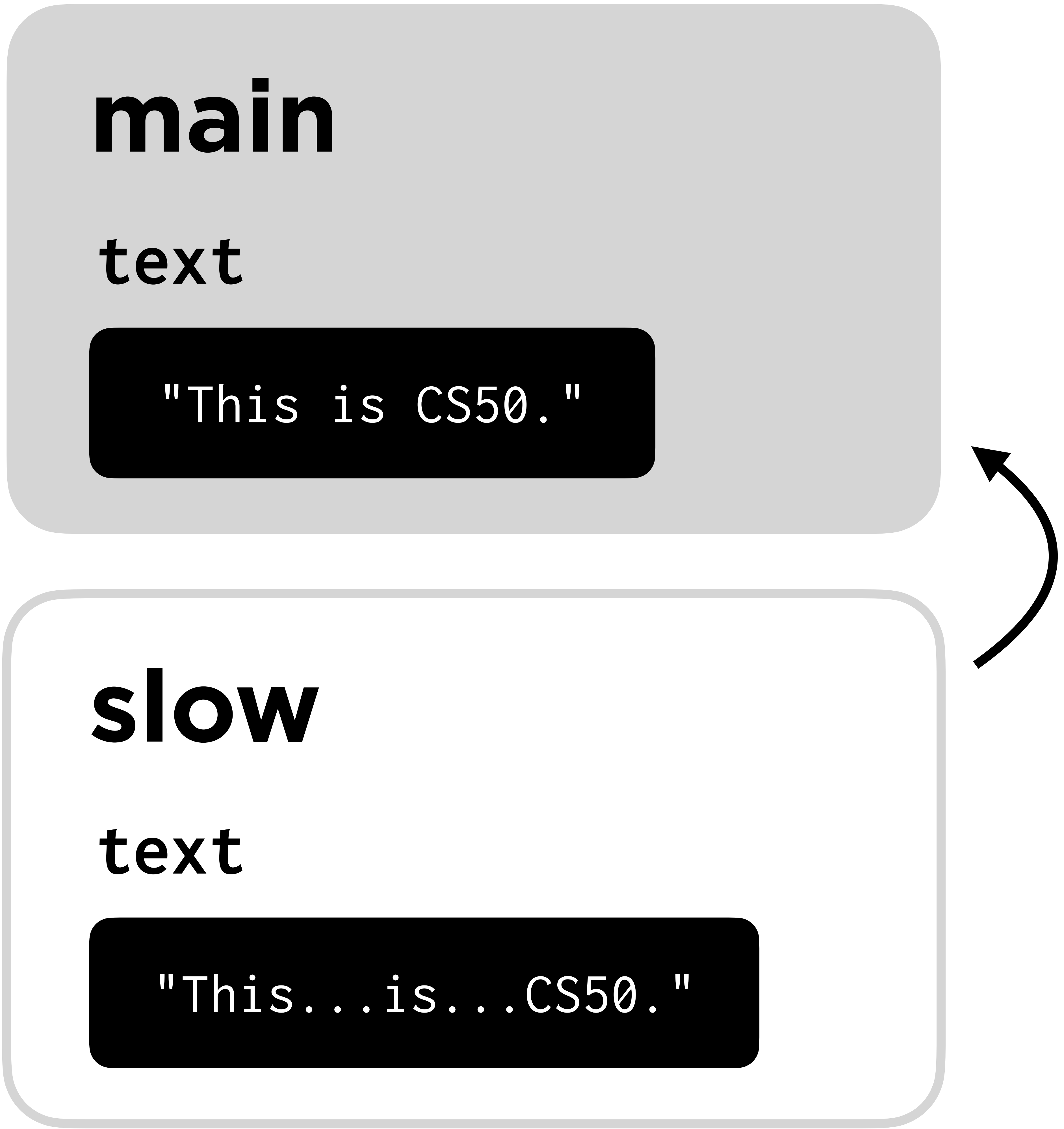
```



main

text

"This is CS50."

slow

text

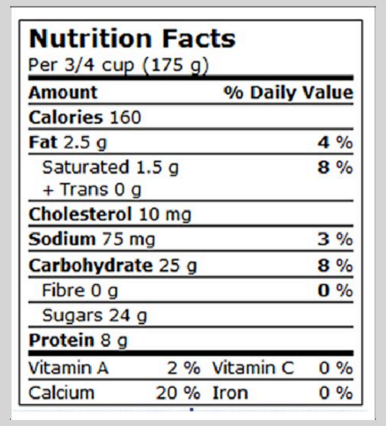
"This...is...CS50."

playback.py

faces.py

twttr.py

coke.py



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Cholesterol 10 mg	
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Vitamin A	2 %	Vitamin C	0 %
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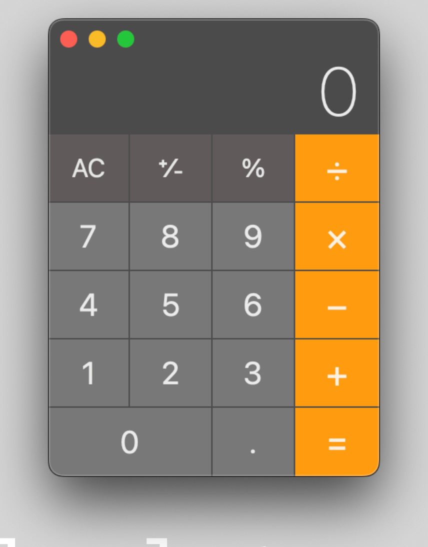
nutrition.py

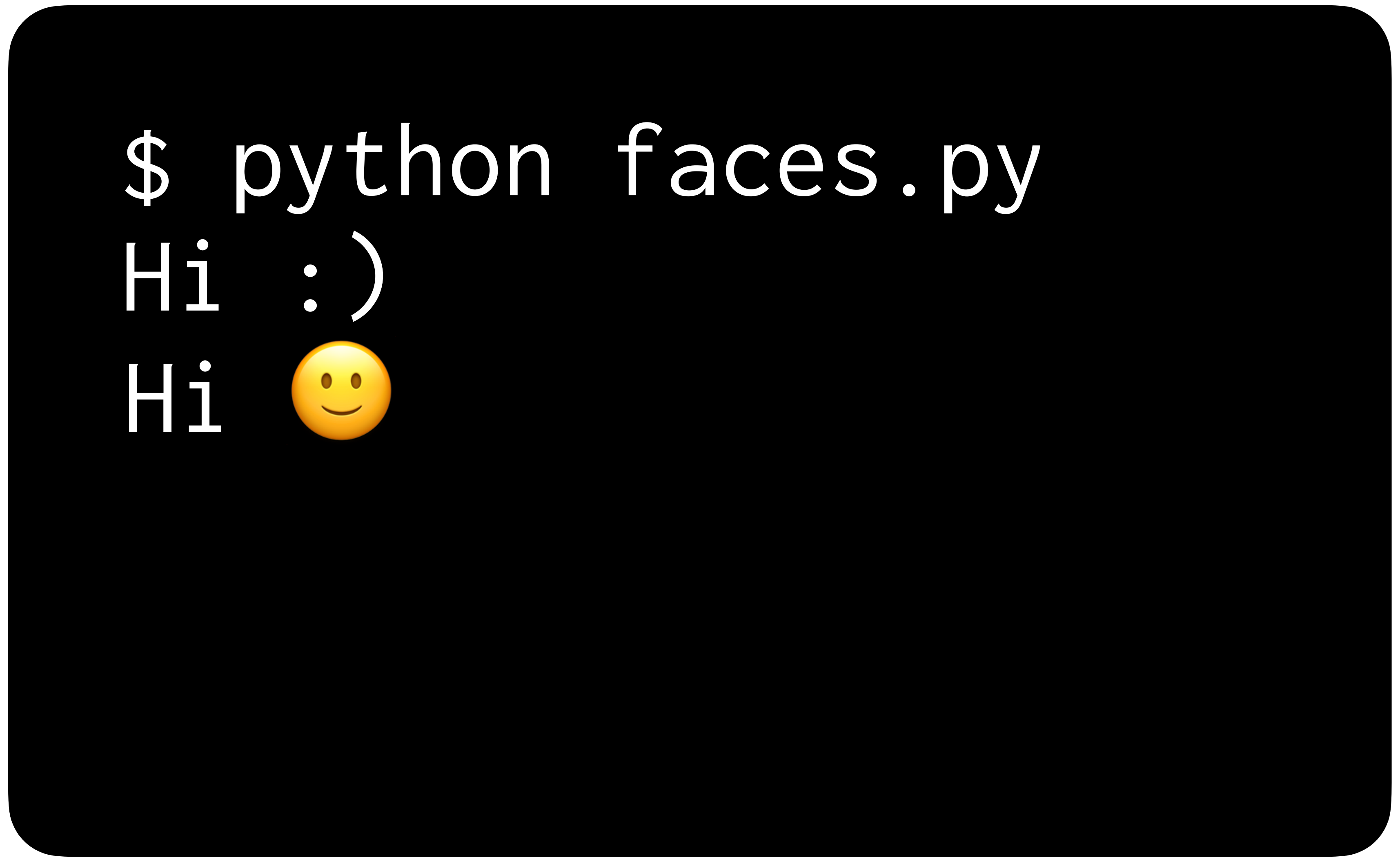


calculator.py

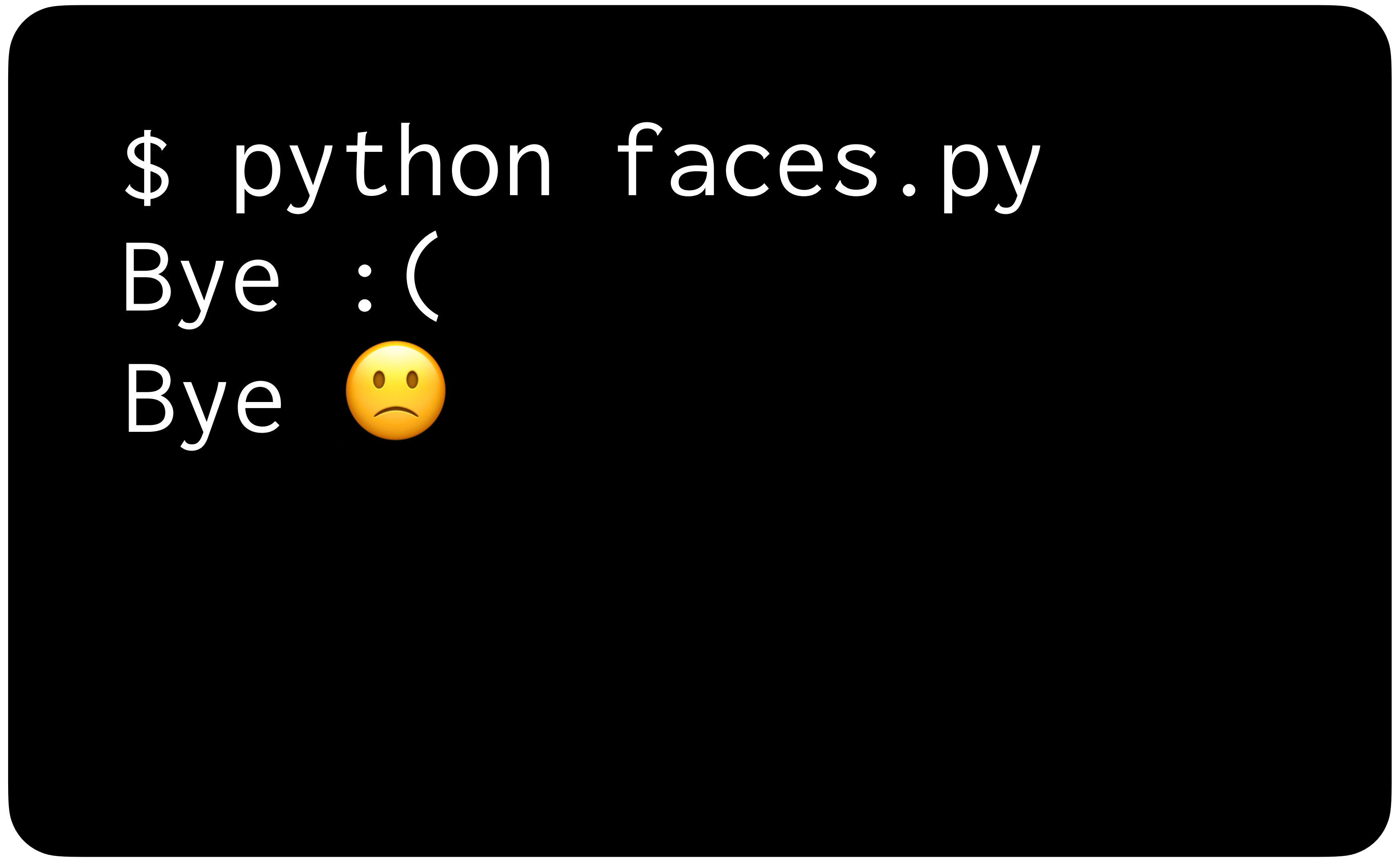
cases.py

🙂

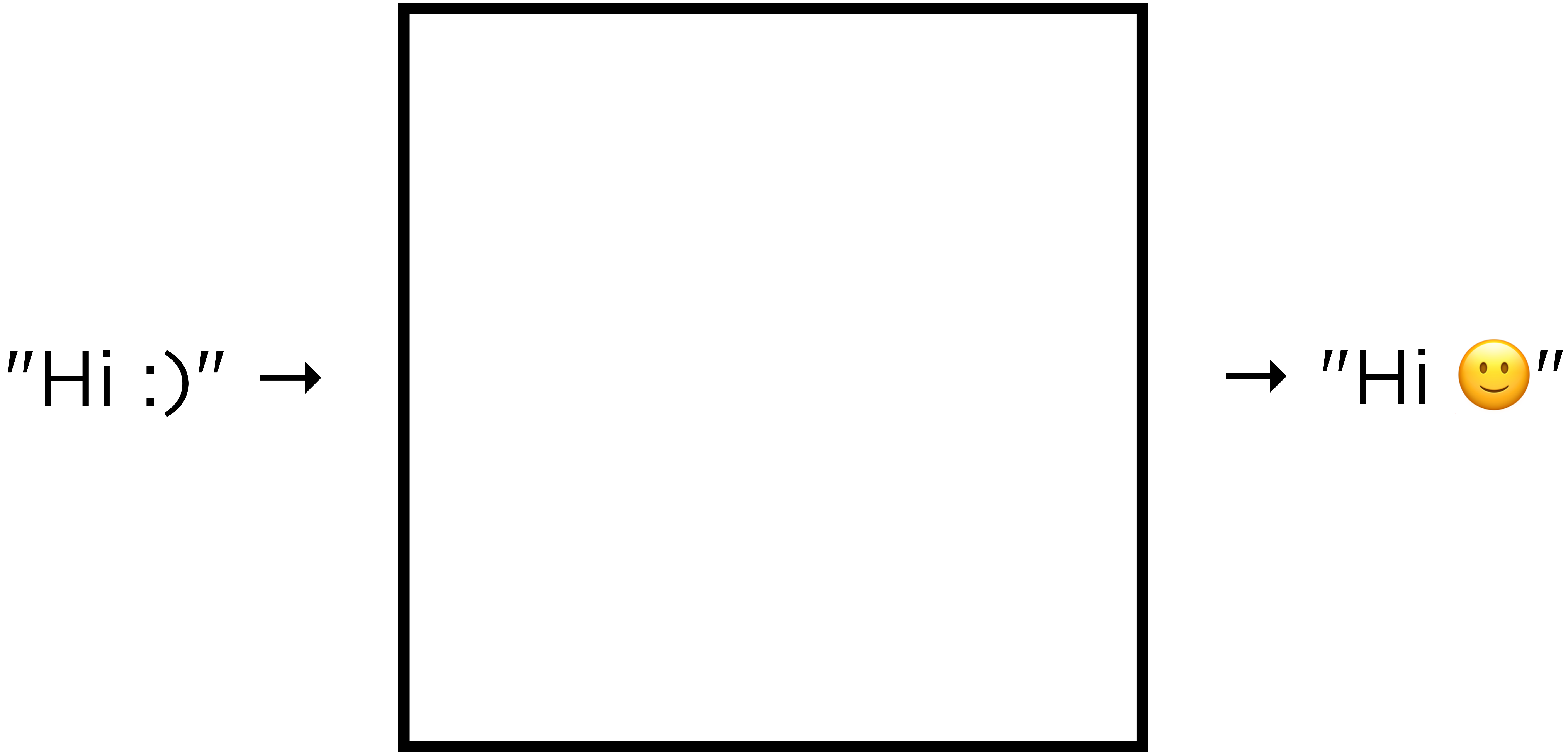
Making Faces



```
$ python faces.py
Hi :)
Hi 🙂
```



```
$ python faces.py
Bye :(
Bye 🙁
```



"Hi :)" →

→ "Hi 🙂"

Abstraction

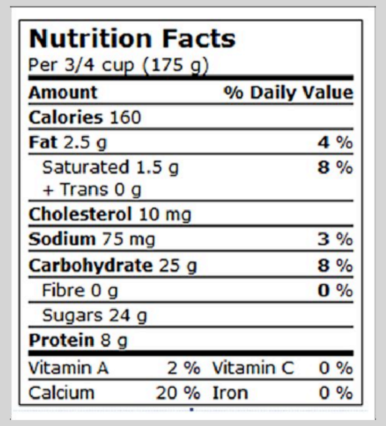
```
def convert(text):
    ...
    return ...
```

playback.py

faces.py

twttr.py

coke.py



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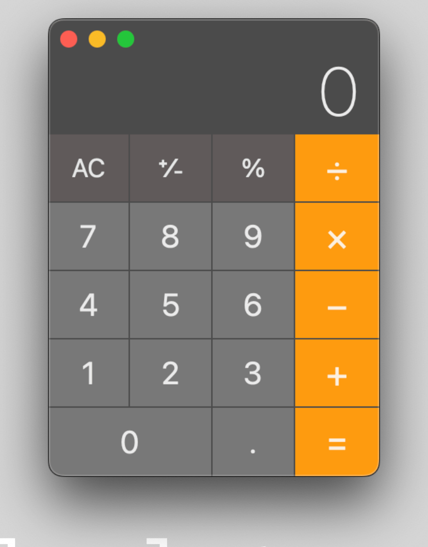
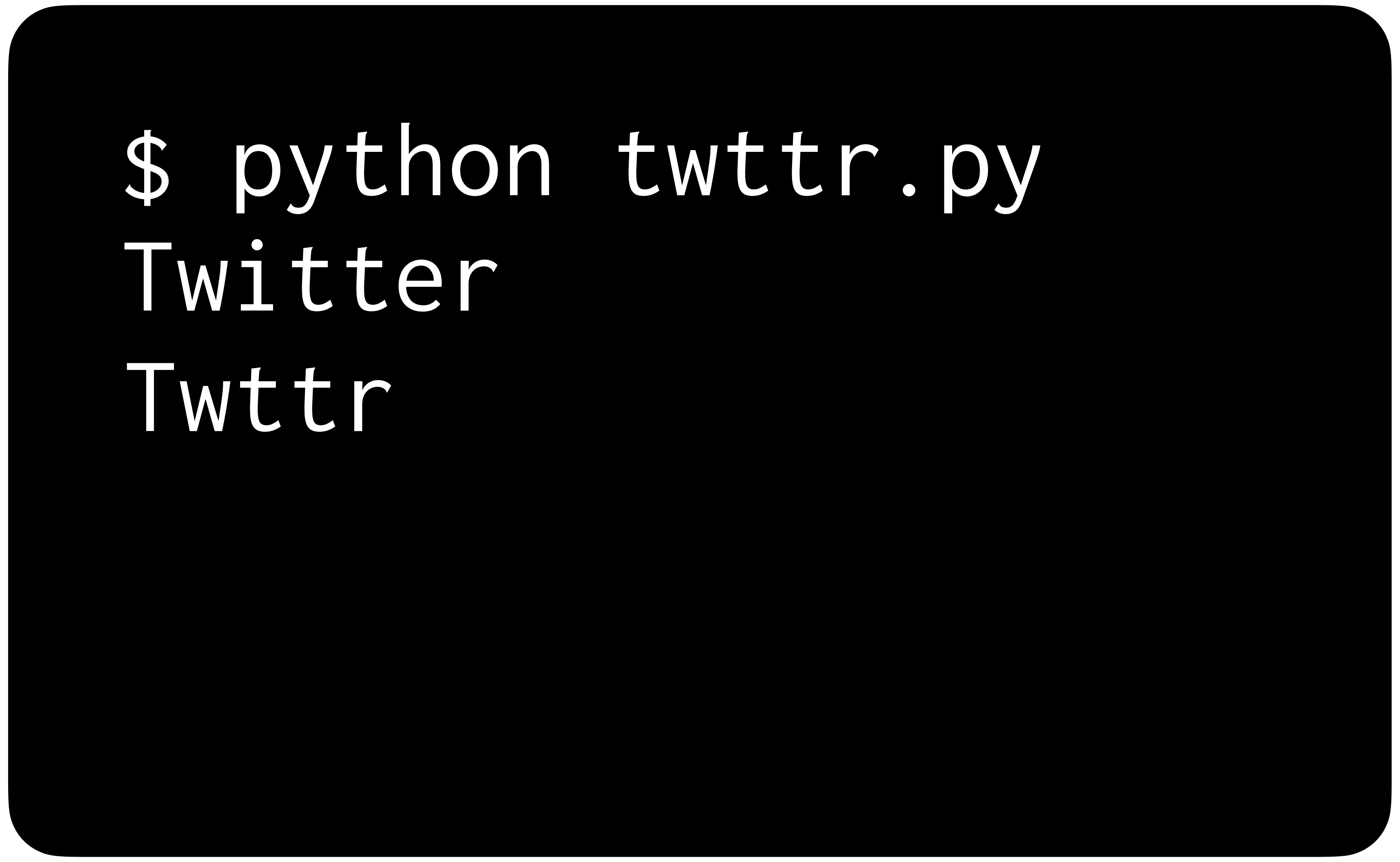
nutrition.py



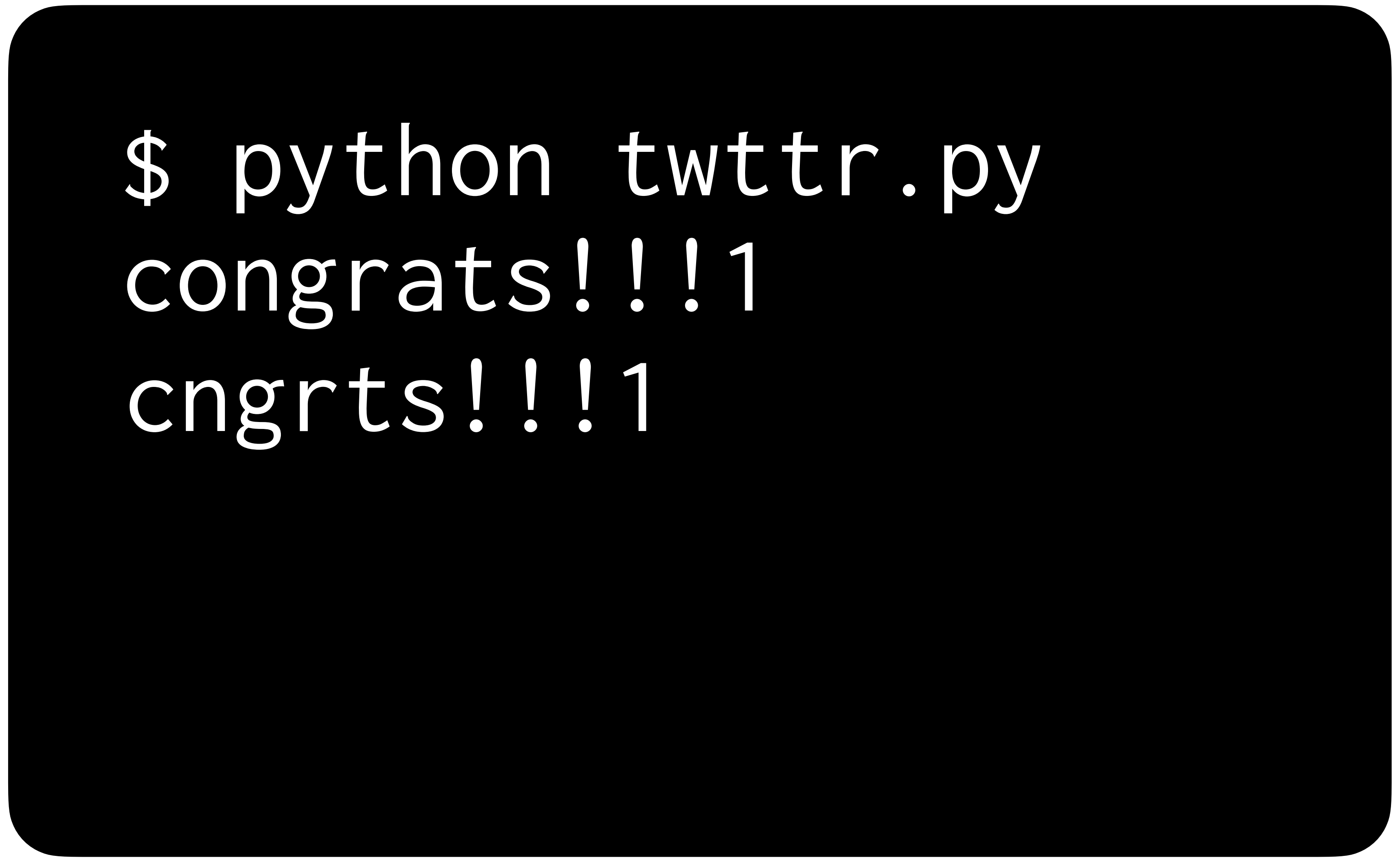
calculator.py

cases.py

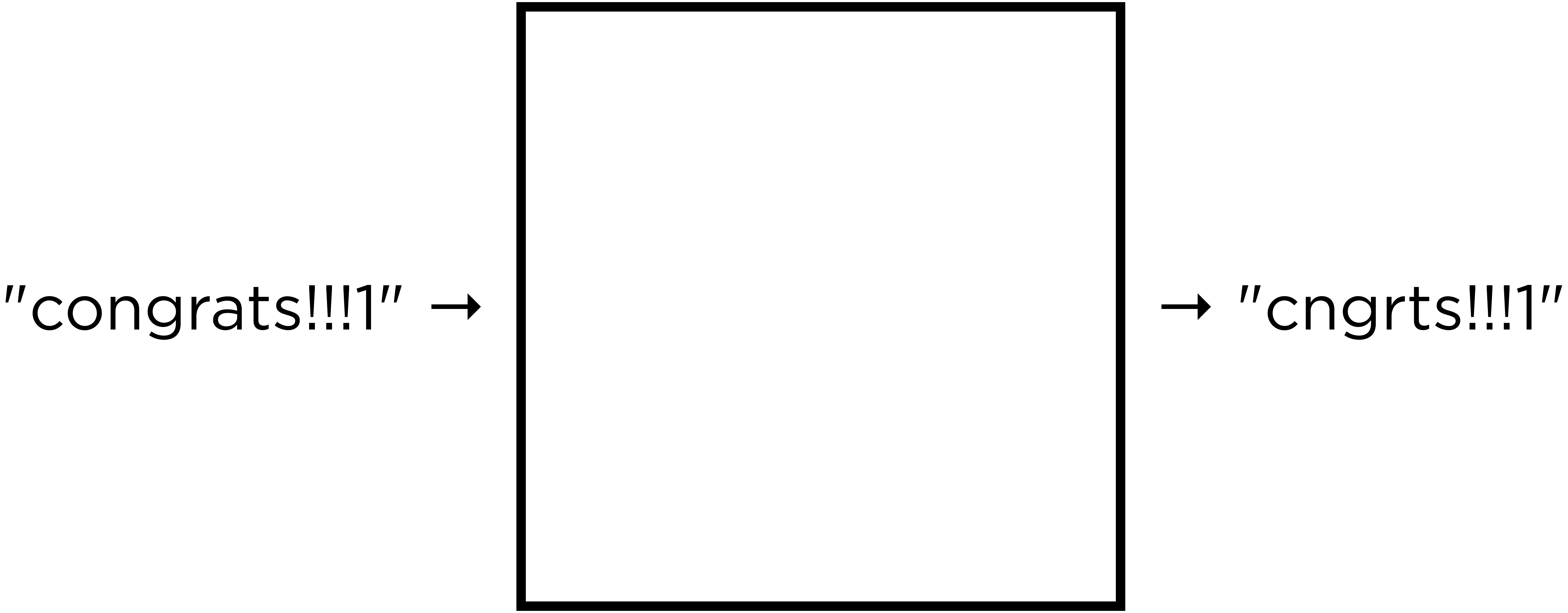
Just setting up my twttr



```
$ python twttr.py
Twitter
Twttr
```



```
$ python twttr.py
congrats!!!1
cngrts!!!1
```



″congrats!!!1″ → → ″cngrts!!!1″

```
text
```

```
text.replace("a", "")
text.replace("a", "").replace("e", "")
text.replace("a", "").replace("e", "").replace("i", "")
```

Pseudocode

```
# Get input from the user
# For each character
    # If character is NOT a vowel
        # Print the character
# Get input from the user
# For each character
    # If character is NOT a vowel
        # Print the character
```

Abstraction

```
def is_vowel(character):
    return ...
```

Lists

A E I O U

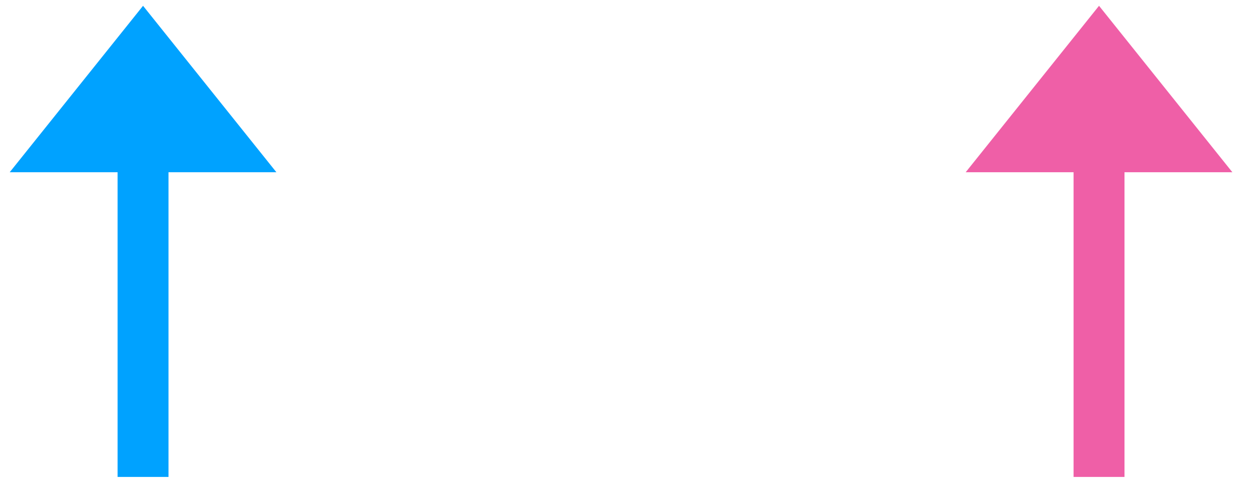
```
'A' 'E' 'I' 'O' 'U'
```

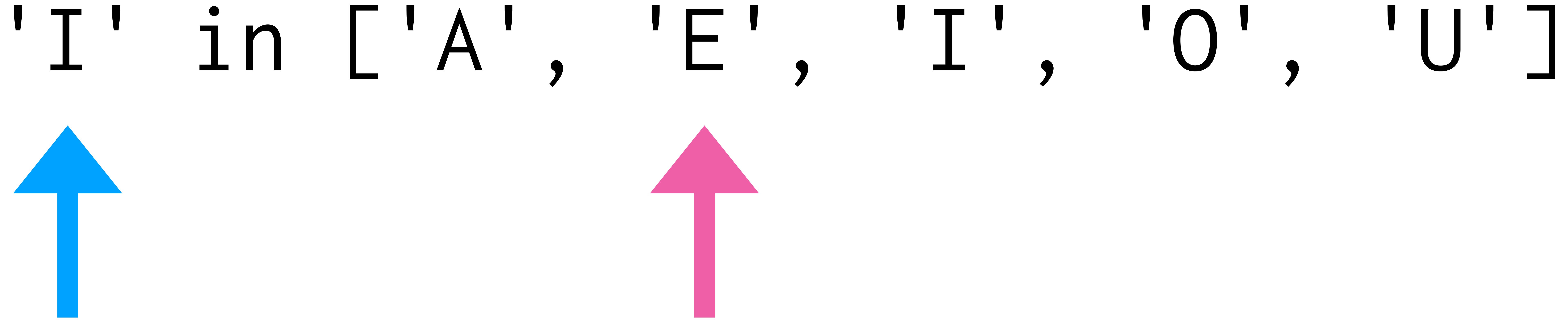
```
['A', 'E', 'I', 'O', 'U']
```

`in`

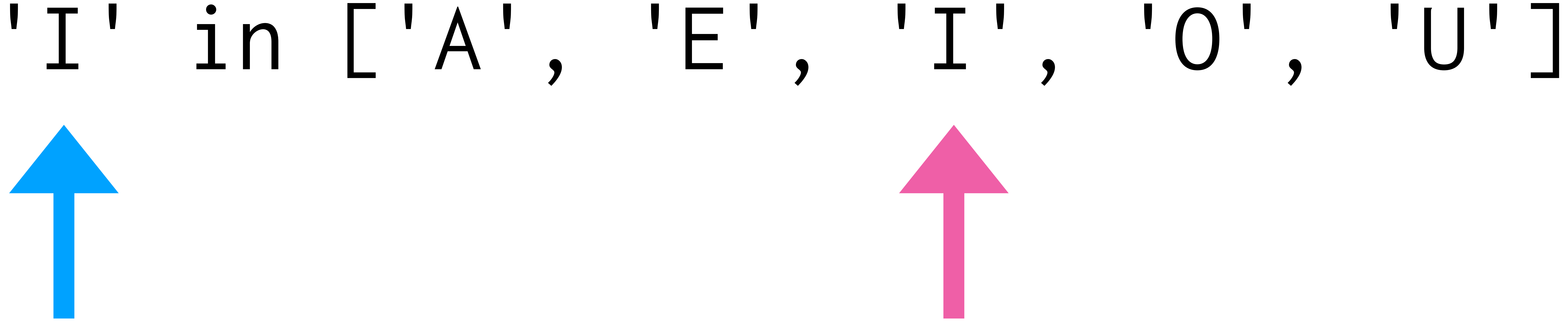
```
'I' in ['A', 'E', 'I', 'O', 'U']
```

```
'I' in ['A', 'E', 'I', 'O', 'U']
```

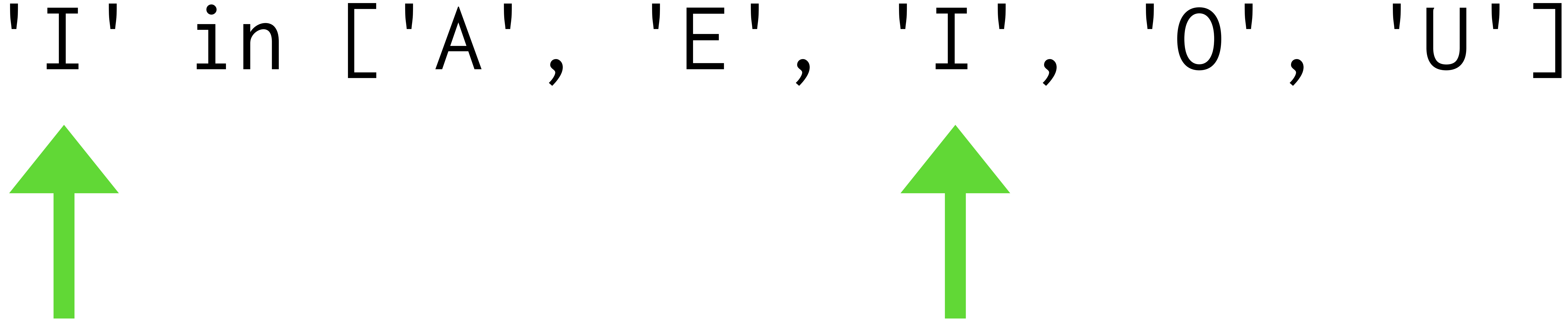




```
'I' in ['A', 'E', 'I', 'O', 'U']
```

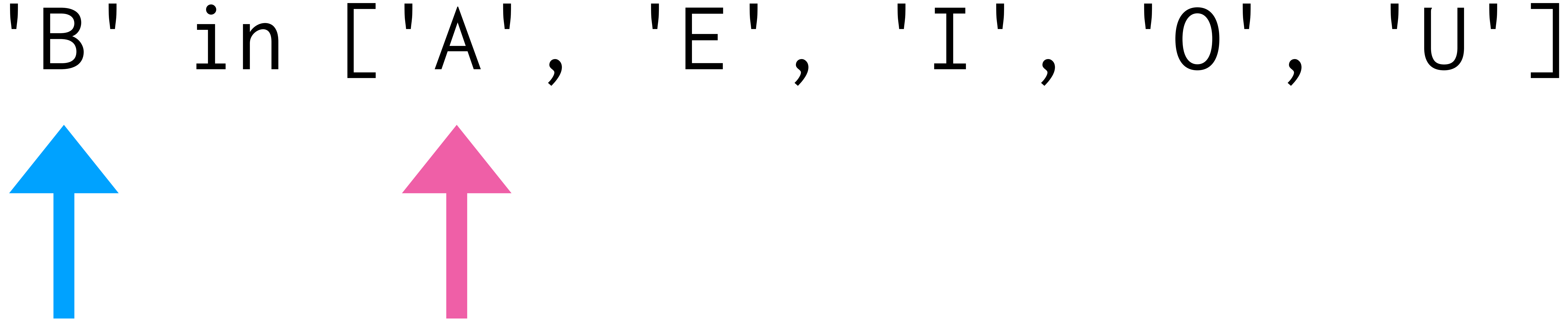


```
'I' in ['A', 'E', 'I', 'O', 'U']
```

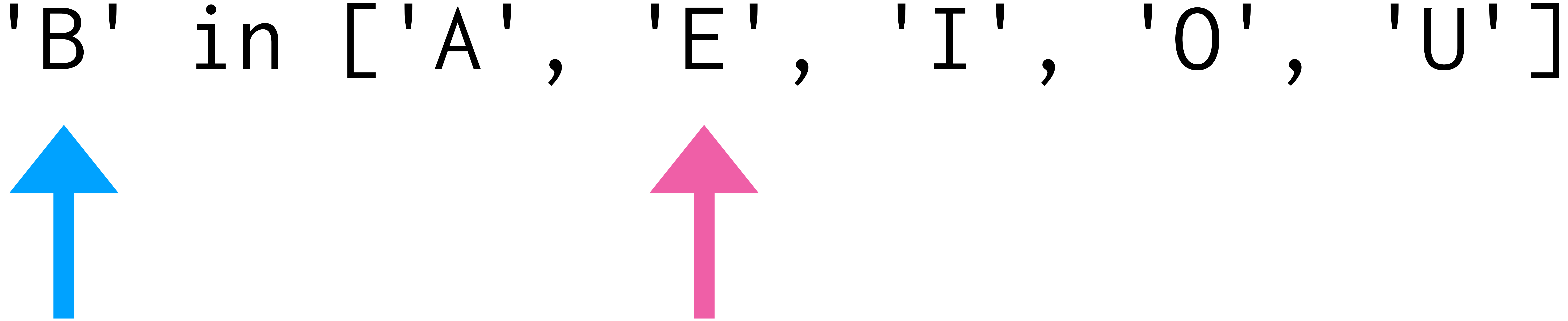


```
'I' in ['A', 'E', 'I', 'O', 'U']
```

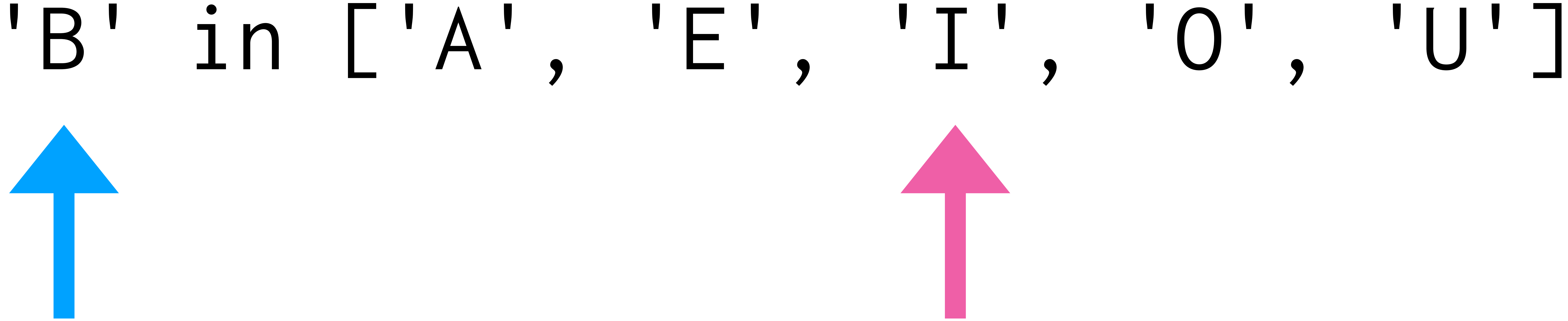
```
'B' in ['A', 'E', 'I', 'O', 'U']
```



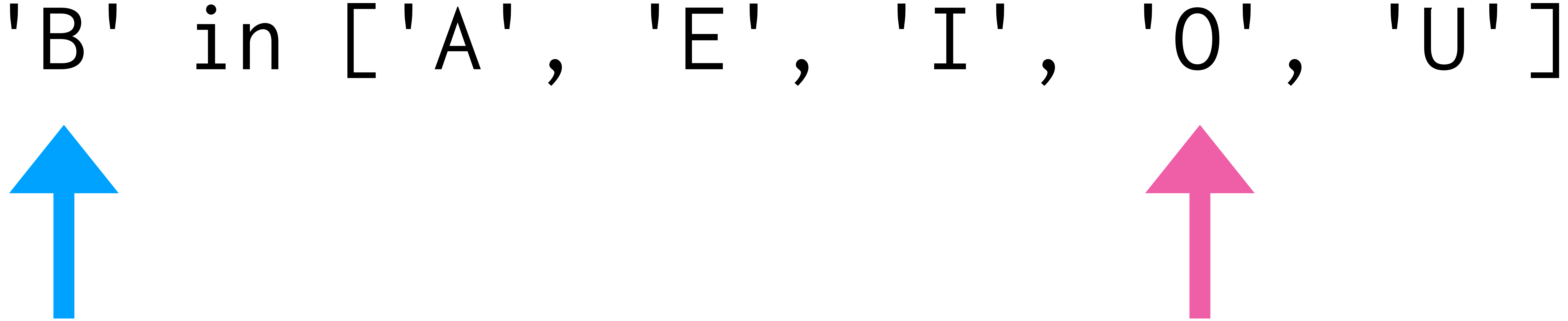
```
'B' in ['A', 'E', 'I', 'O', 'U']
```



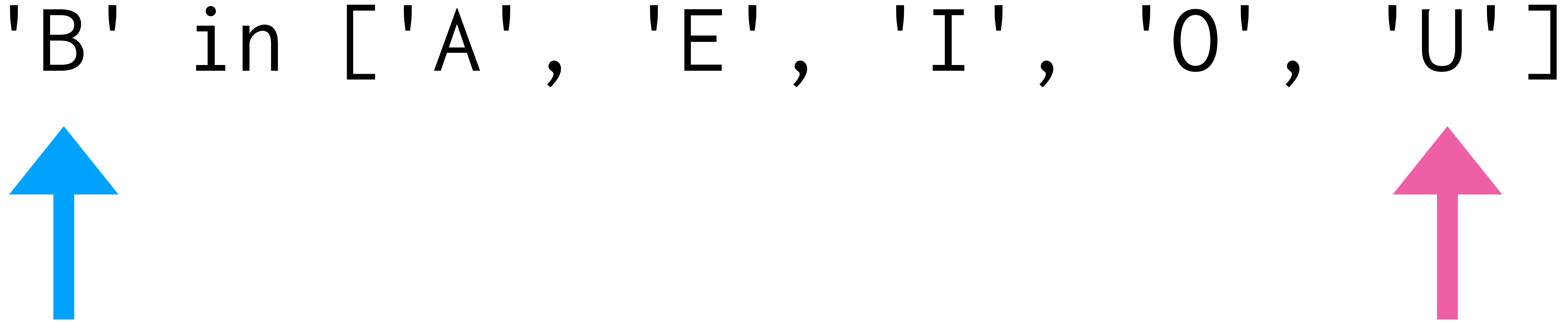
```
'B' in ['A', 'E', 'I', 'O', 'U']
```



```
'B' in ['A', 'E', 'I', 'O', 'U']
```



```
'B' in ['A', 'E', 'I', 'O', 'U']
```



```
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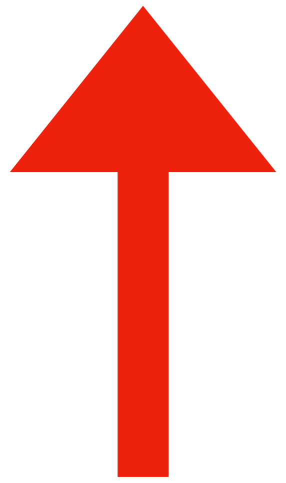
```

```
'B' in ['A', 'E', 'I', 'O', 'U']
```



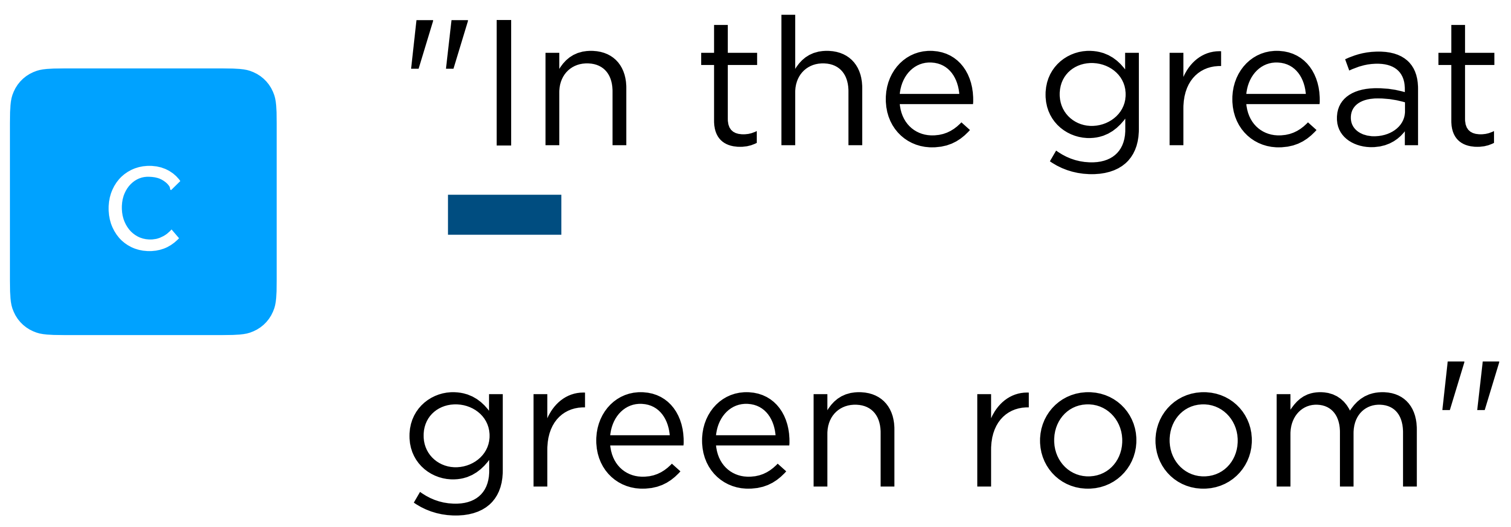
```
# Get input from the user
# For each character
  # If character is NOT a vowel
    # Print the character
```

```
for c in text:
    print(c)
```

”In the great

green room”

```
for c in text:
    print(c)
```



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green room"

```
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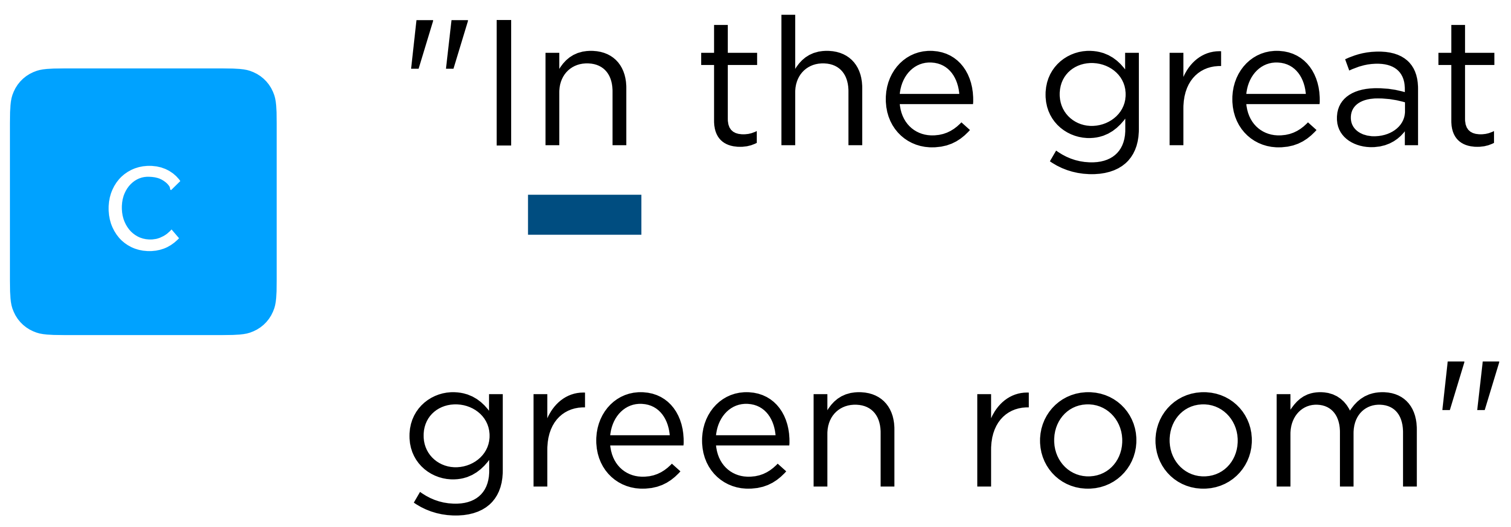
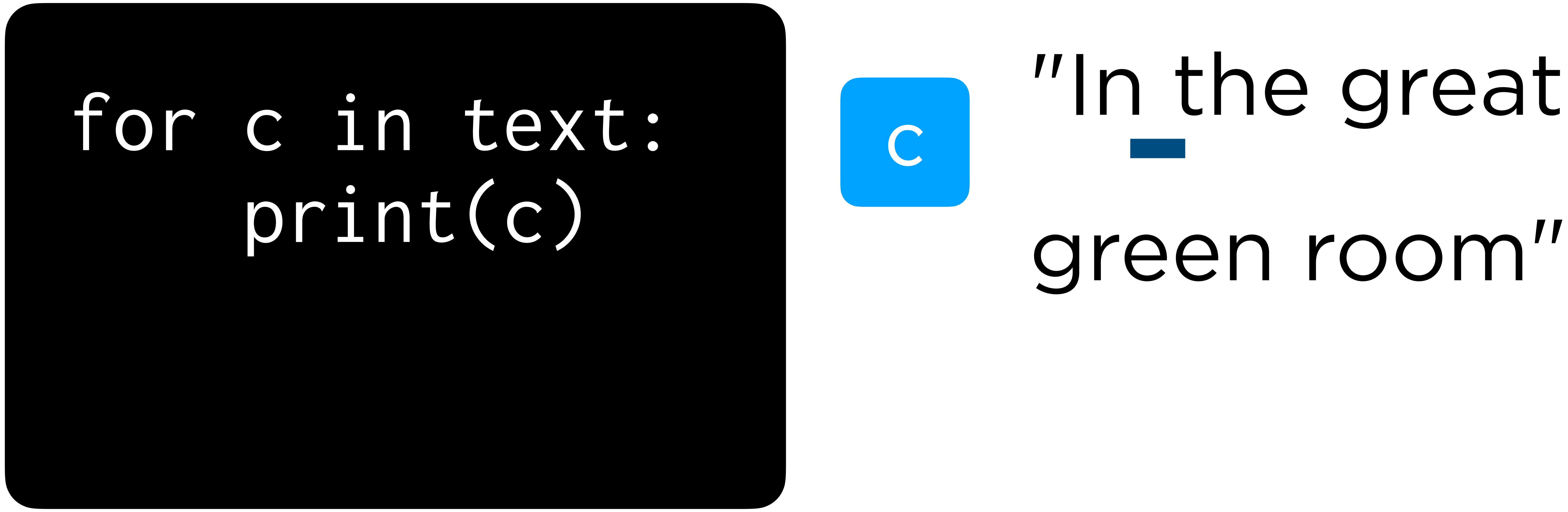


c

"In the great

green room"



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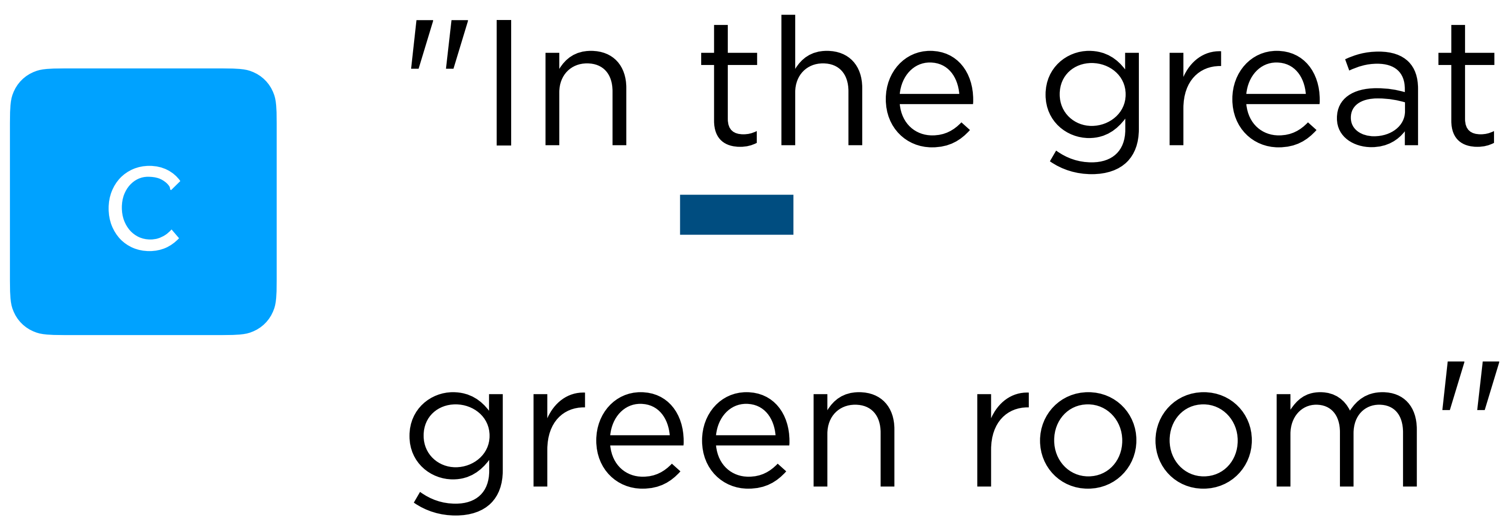

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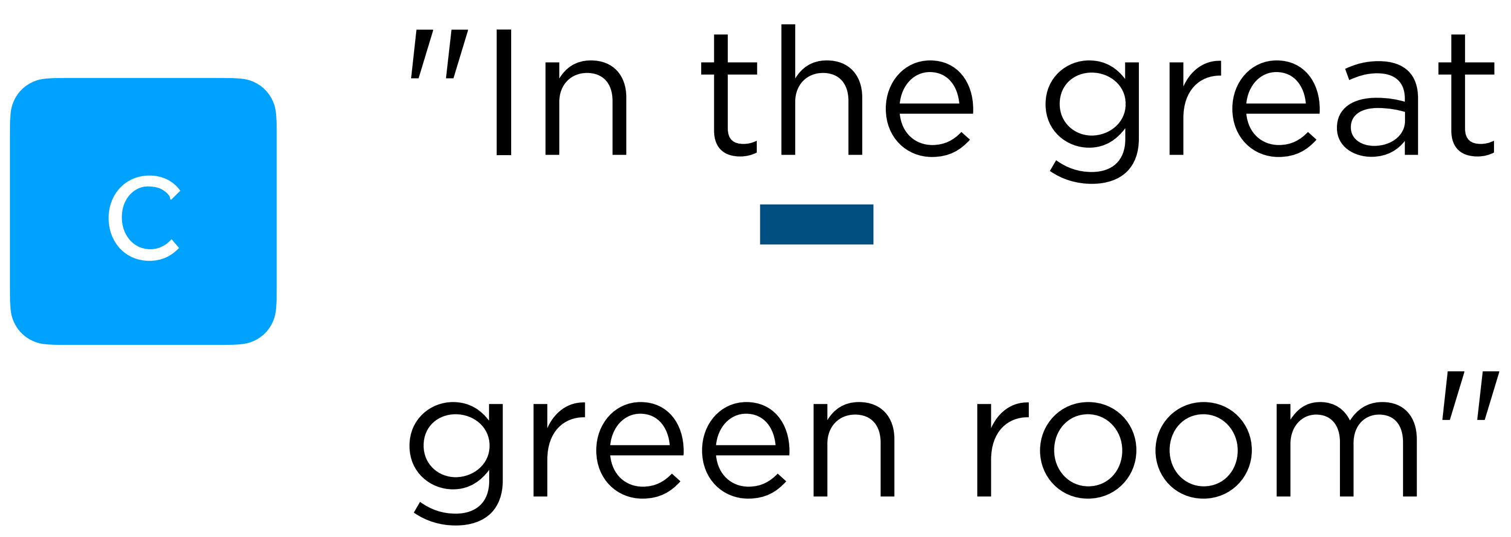

c

"In the great
green room"

```
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    print(c)
```

c

"In the great

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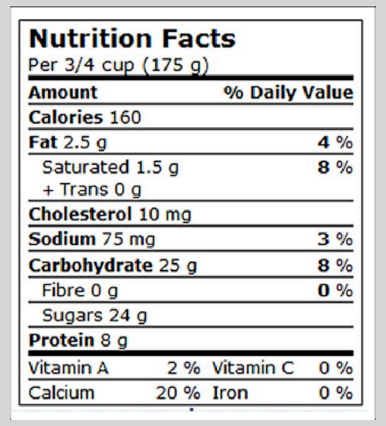
# For each character
    # If character is NOT a vowel
        # Print the character
```

playback.py

faces.py

twttr.py

coke.py



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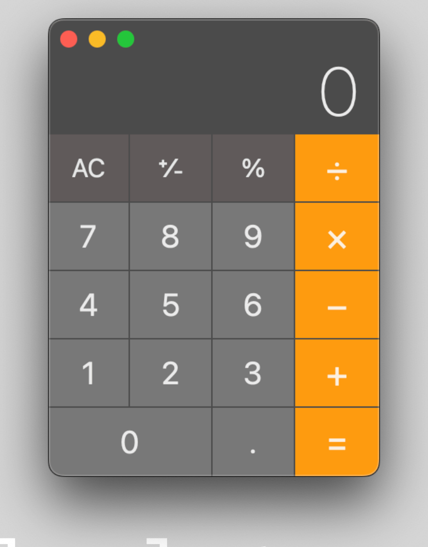
nutrition.py



calculator.py

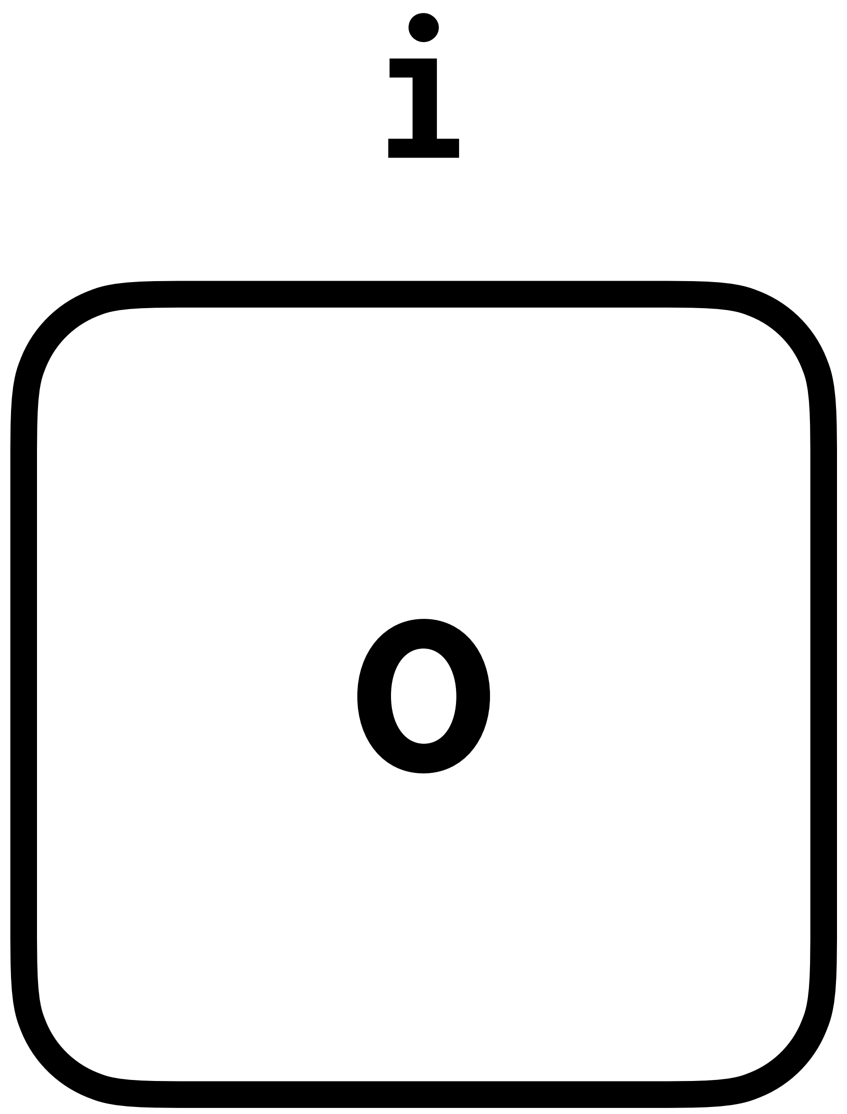
cases.py

Coke Machine

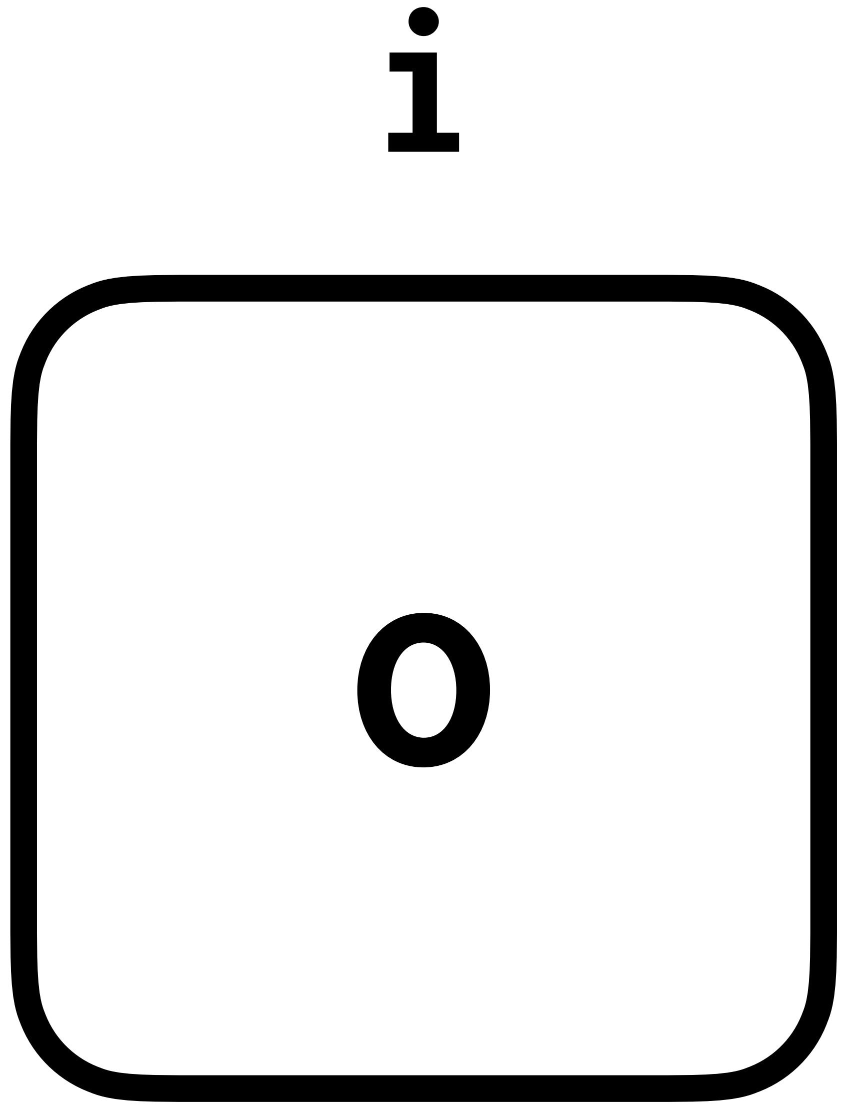
While Loops

```
i = 0
while i < 3:
  i += 1
```

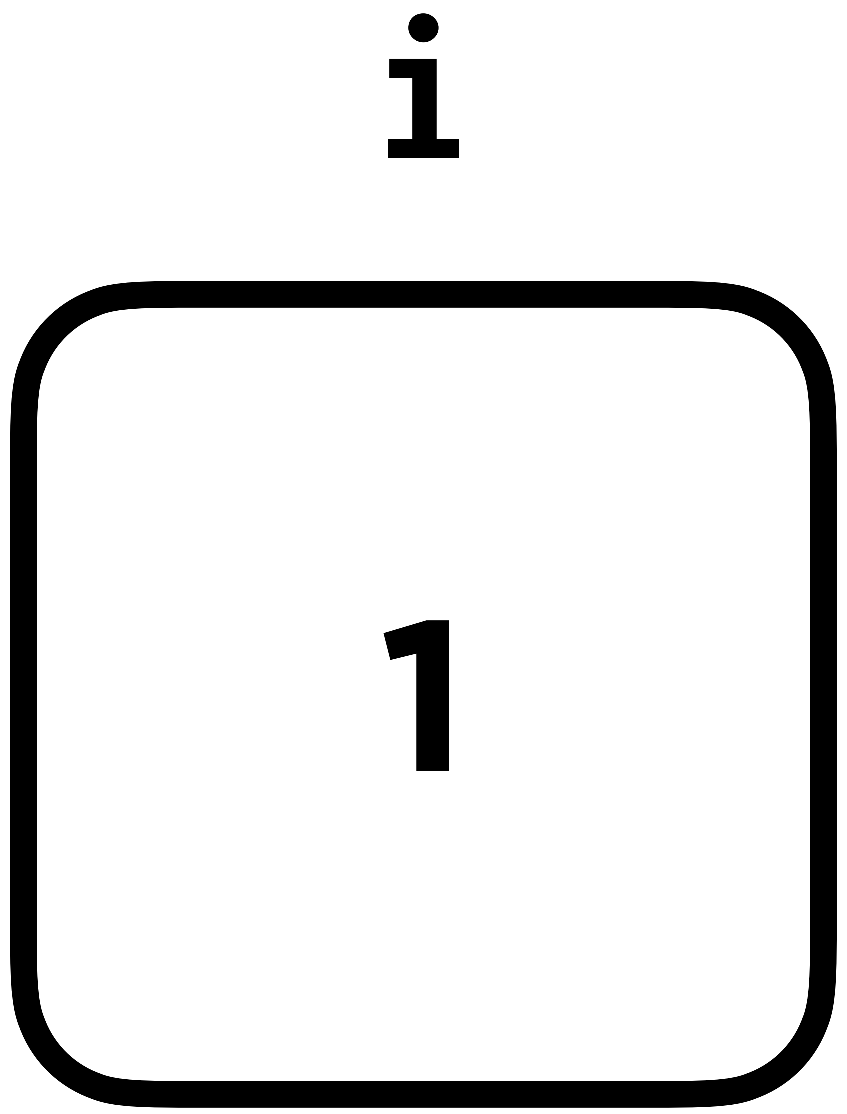
```
i = 0
while i < 3:
    i += 1
```



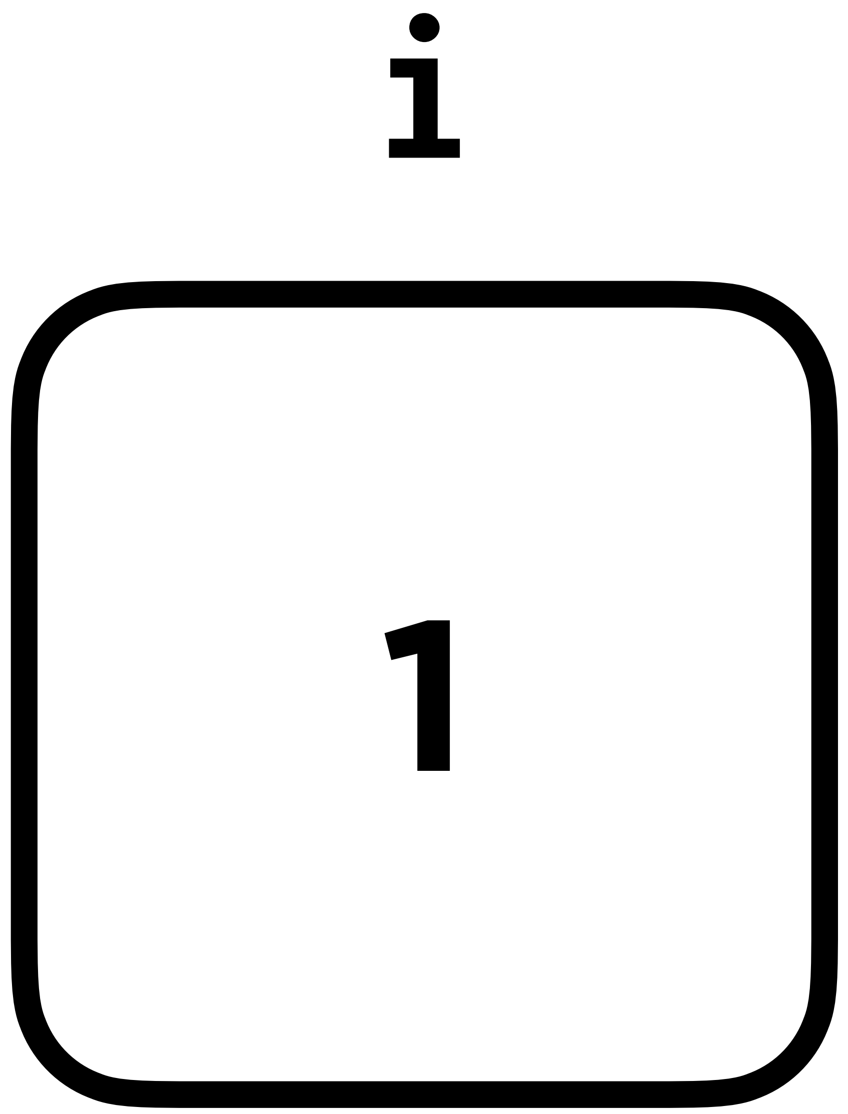
```
i = 0
while i < 3:
    i += 1
```



```
i = 0
while i < 3:
    i += 1
```



```
i = 0
while i < 3:
    i += 1
```



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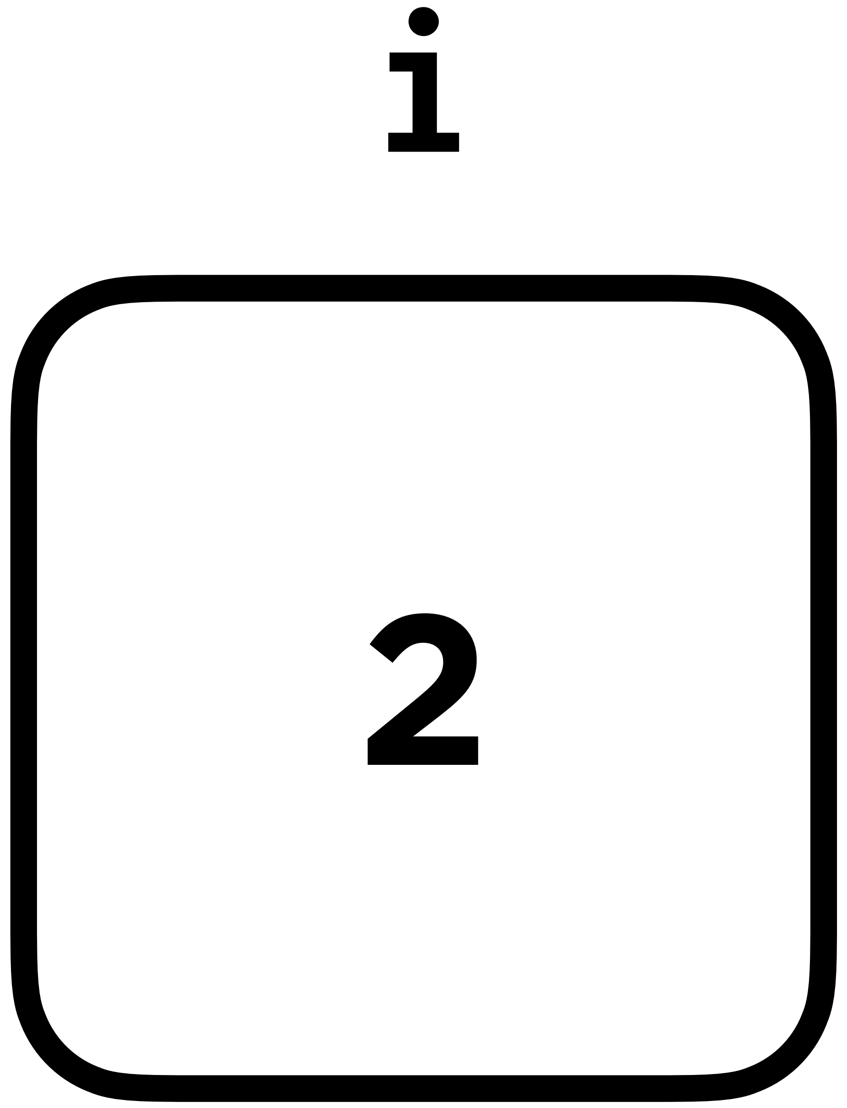
```



```
i = 0
while i < 3:
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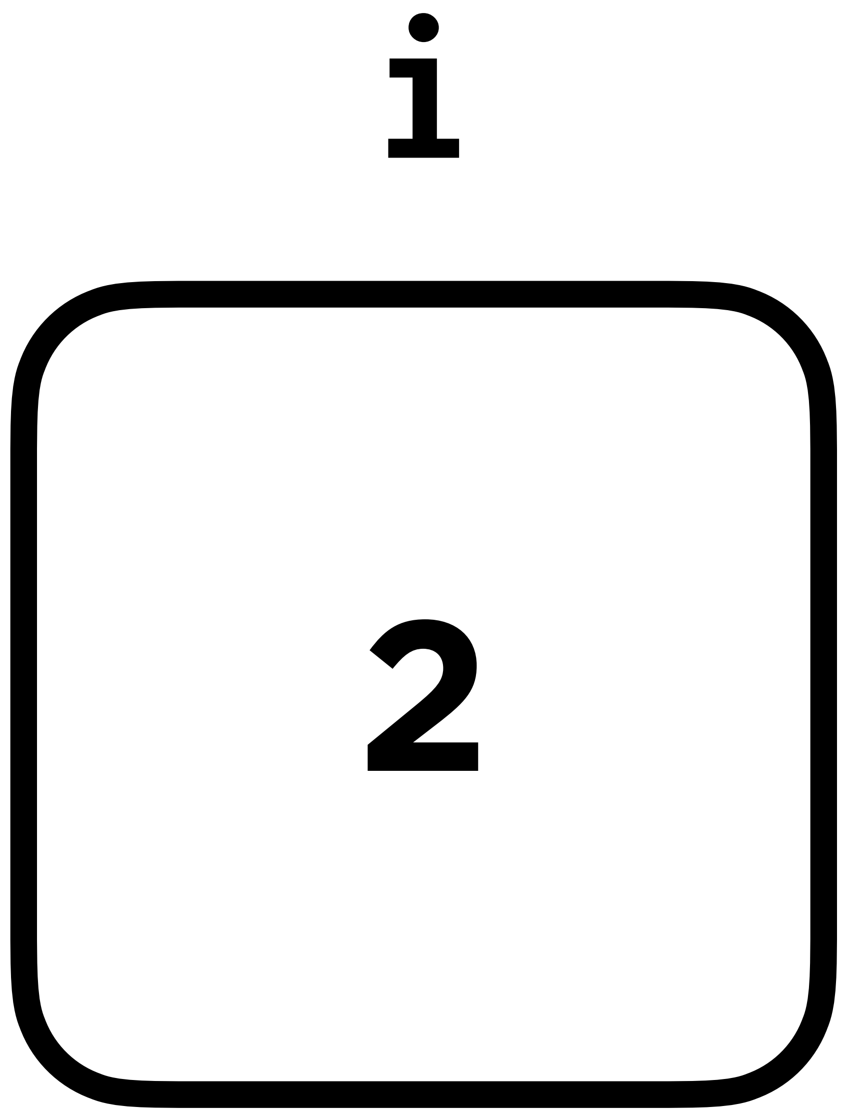
```



```
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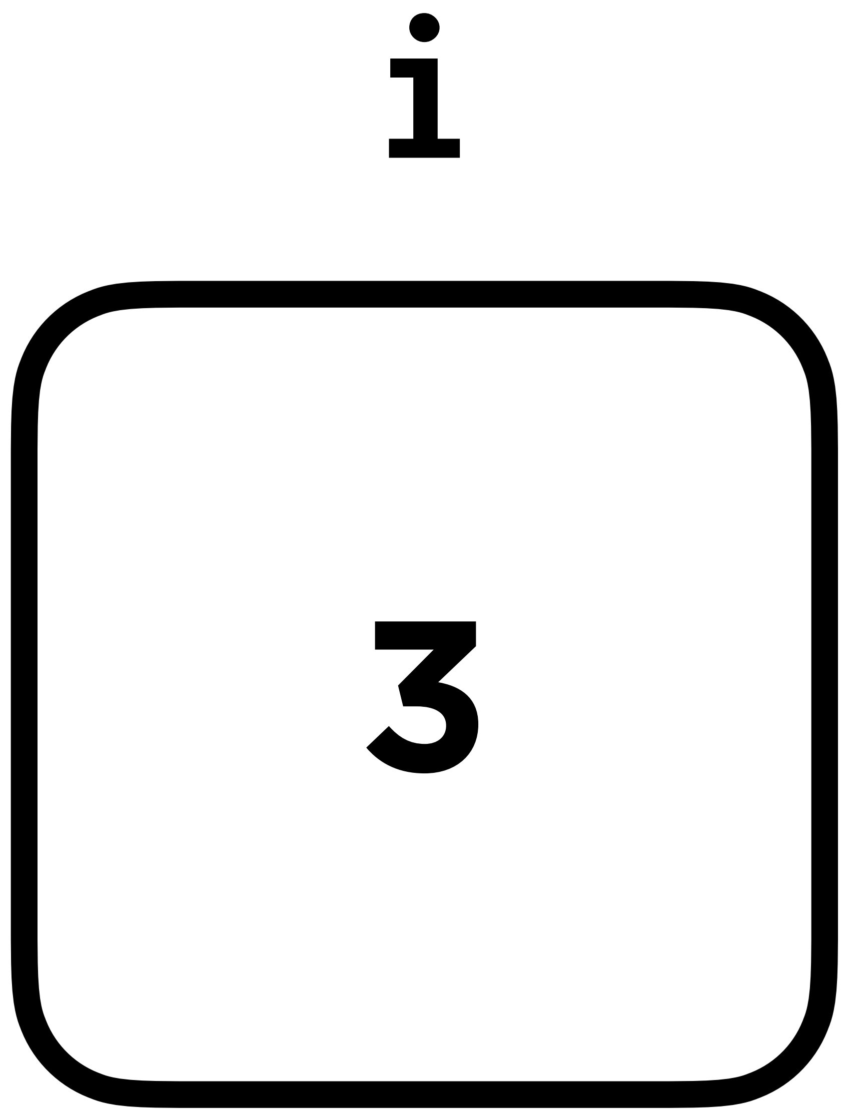
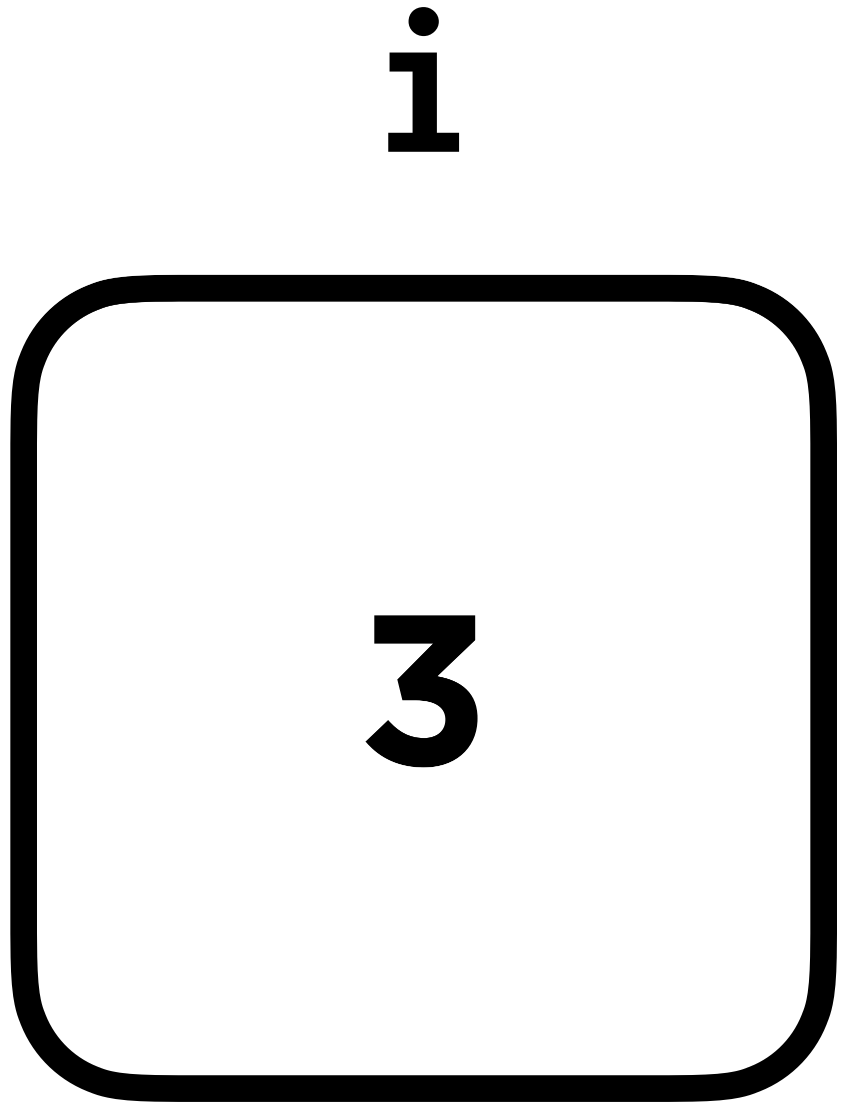
while i < 3:
    i += 1
```



```
i = 0
while i < 3:
  i += 1
```



Pseudocode

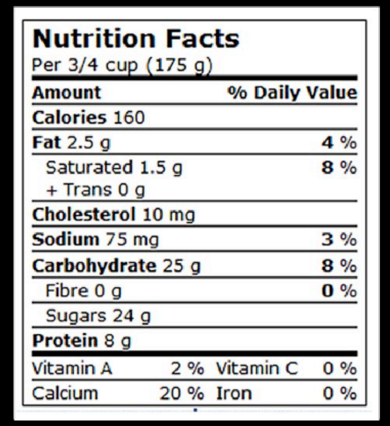
```
# While amount owed is > 0
    # Accept coin from user
    # Check if valid coin
        # Subtract coin from amount owed
```

playback.py

faces.py

twttr.py

coke.py

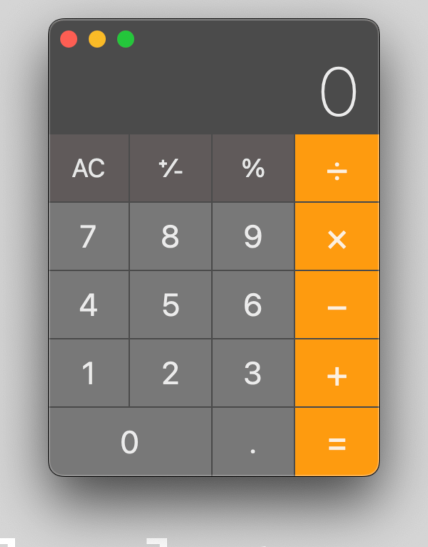


Nutrition Facts

Per 3/4 cup (175 g)

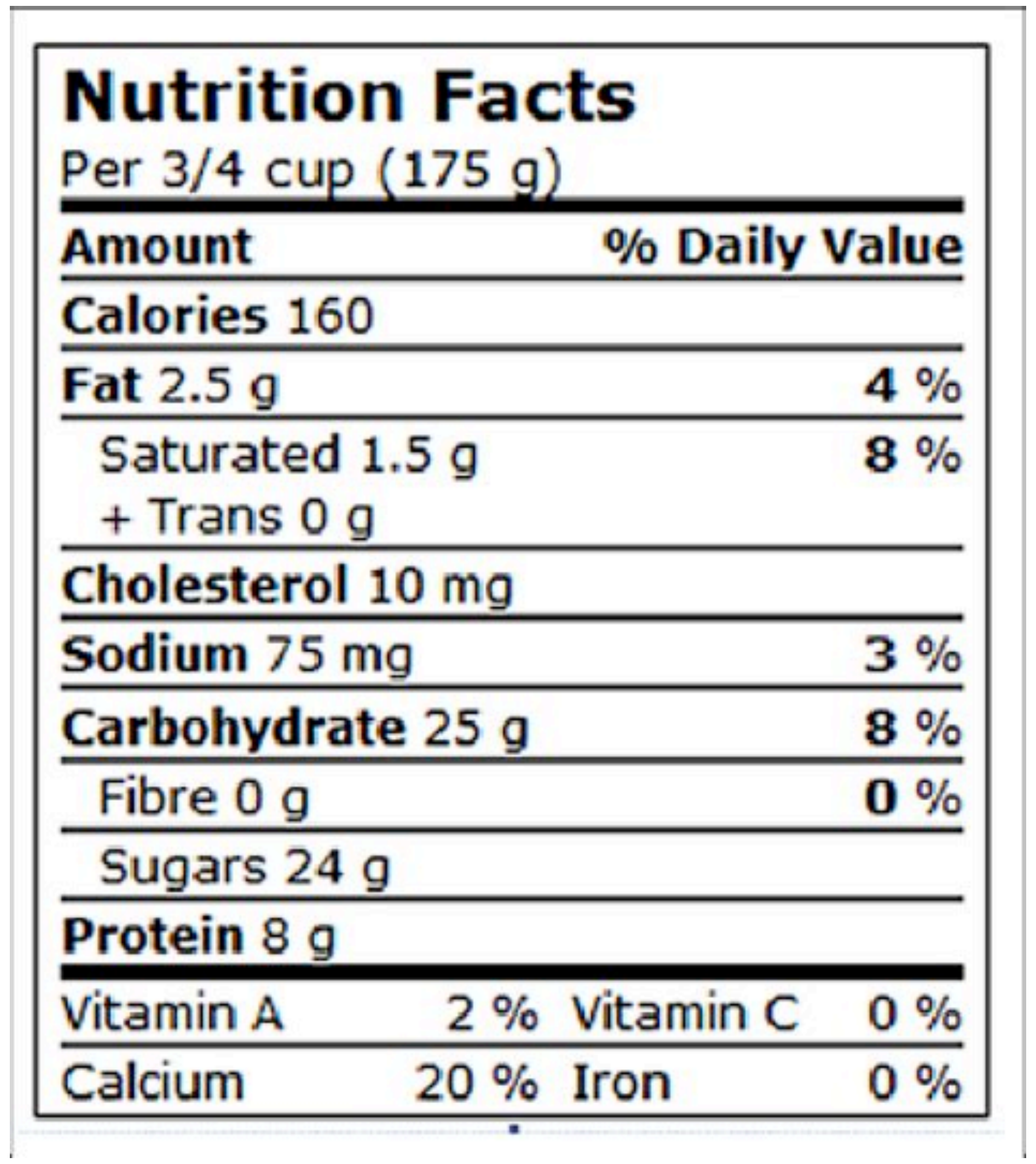
Amount			**% Daily Value**
Calories 160			
Fat 2.5 g			**4** %
Saturated 1.5 g + Trans 0 g			**8** %
Cholesterol 10 mg			
Sodium 75 mg			**3** %
Carbohydrate 25 g			**8** %
Fibre 0 g			**0** %
Sugars 24 g			
Protein 8 g			
Vitamin A	2 %	Vitamin C	0 %
Calcium	20 %	Iron	0 %

nutrition.py



calculator.py

cases.py



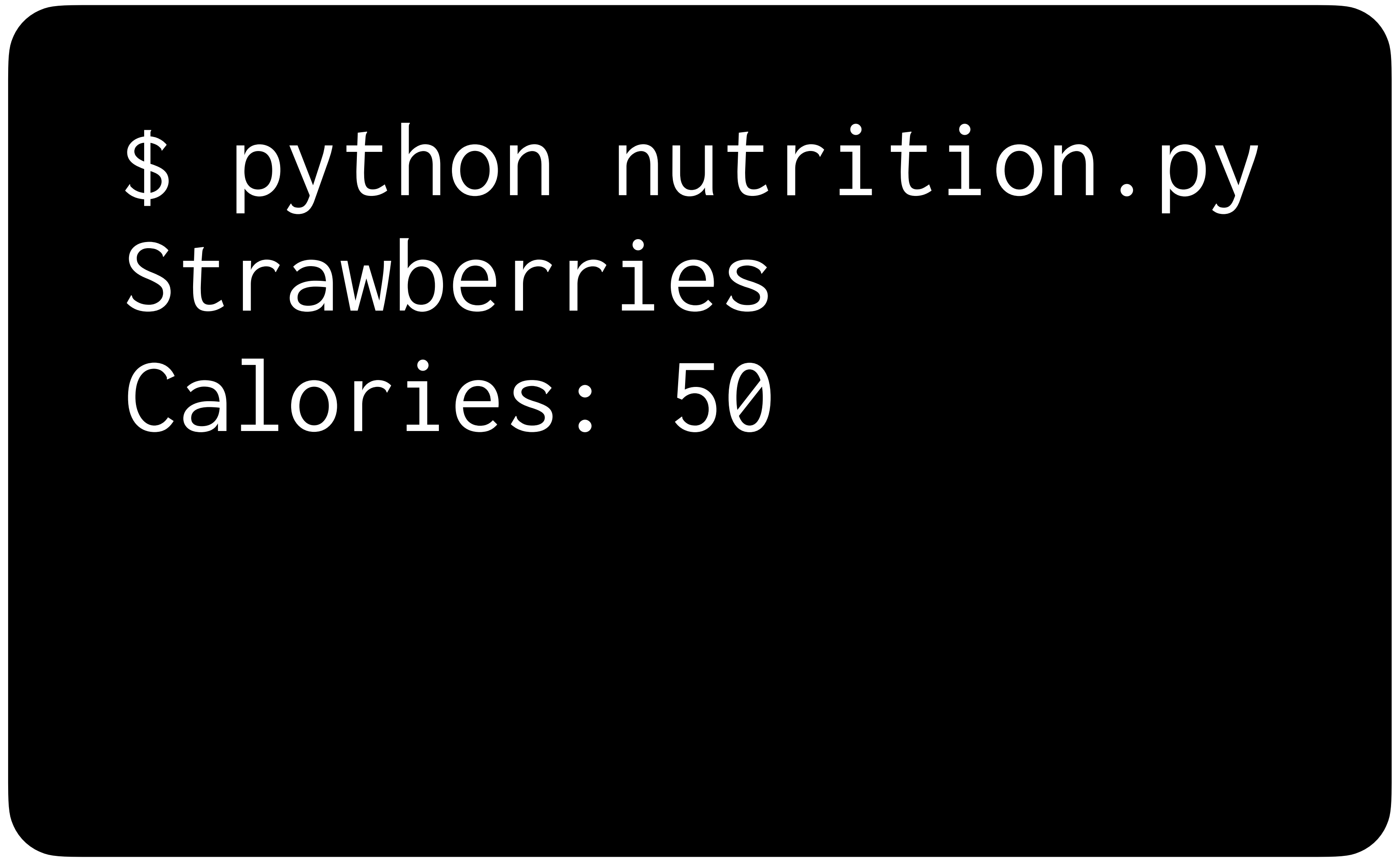
Nutrition Facts

Per 3/4 cup (175 g)

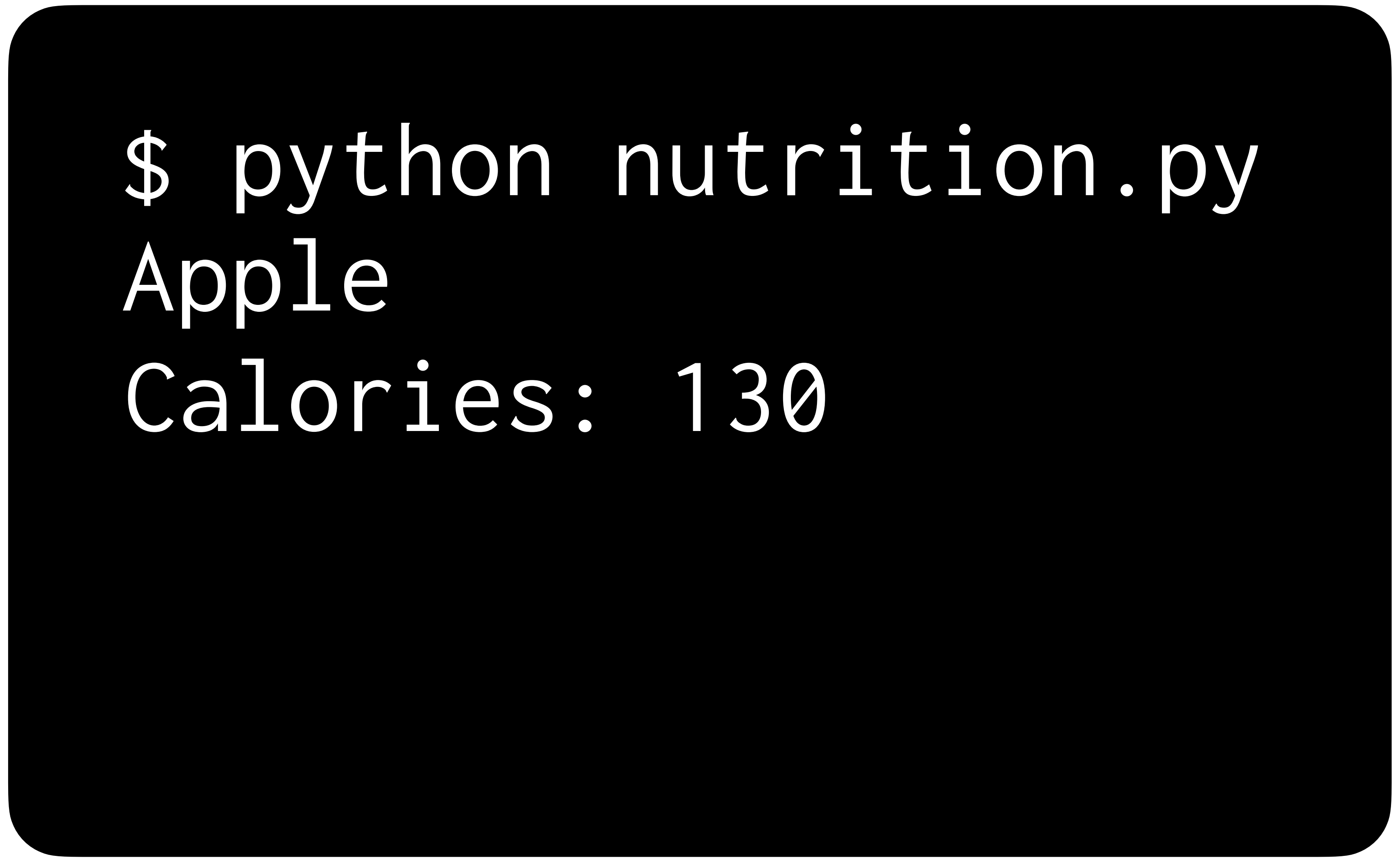
Amount	% Daily Value
Calories 160	
Fat 2.5 g	**4** %
Saturated 1.5 g + Trans 0 g	**8** %
Cholesterol 10 mg	
Sodium 75 mg	**3** %
Carbohydrate 25 g	**8** %
Fibre 0 g	**0** %
Sugars 24 g	
Protein 8 g	

Vitamin A	2 %	Vitamin C	0 %
Calcium	20 %	Iron	0 %

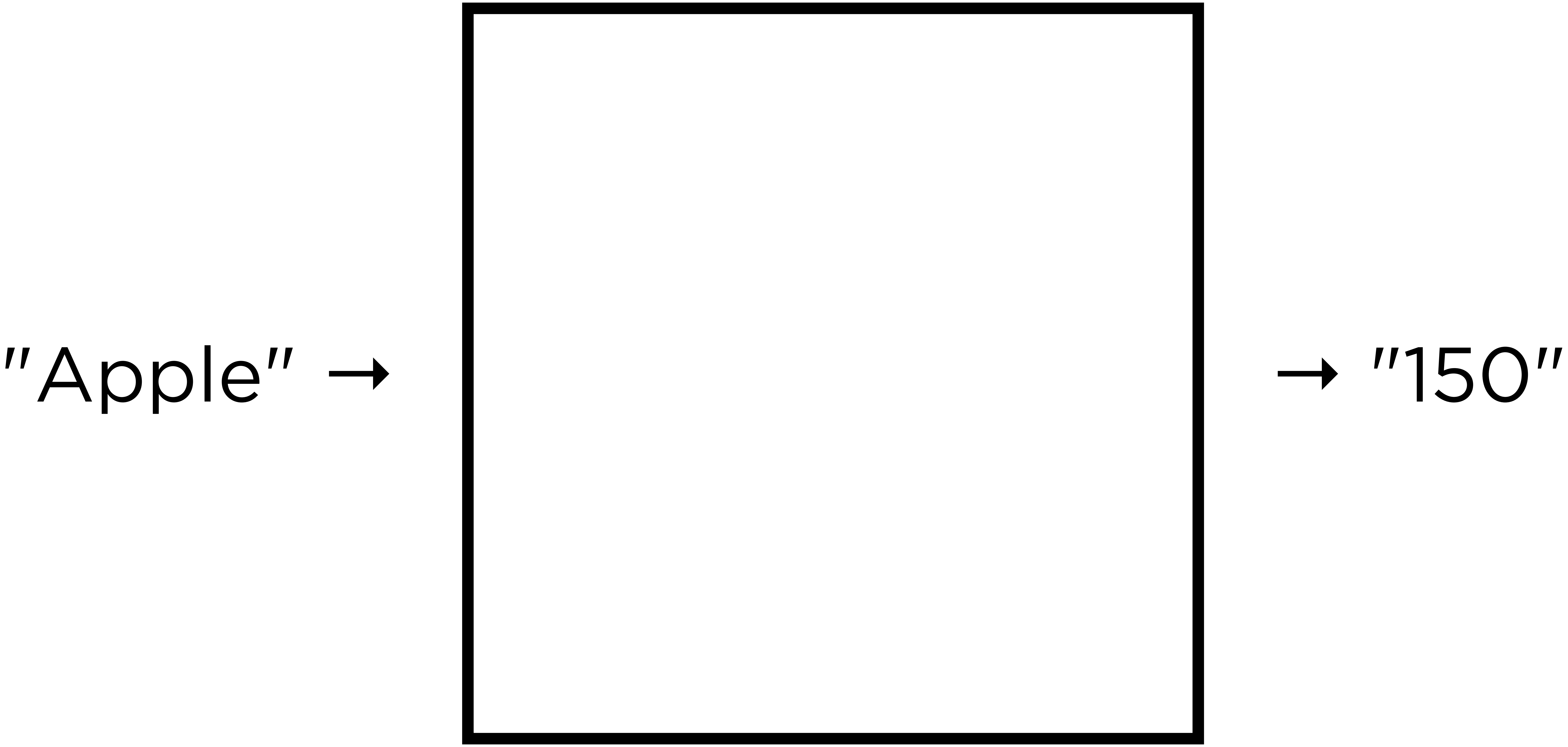
Nutrition



```
$ python nutrition.py
Strawberries
Calories: 50
```



```
$ python nutrition.py
Apple
Calories: 130
```



"Apple" →

→ "150"

Dictionaries

```
fruits = {
    "apple": 130,
    "strawberries": 50
}
```

Key	Value
apple	130
strawberries	50

```
fruits = {
    "apple": 130,
    "strawberries": 50
}

fruits["strawberries"]
```

Key	Value
apple	130
strawberries	50

```
fruits = {
    "apple": 130,
    "strawberries": 50
}

fruits["apple"]
```

Key	Value
apple	130
strawberries	50

Exceptions

```
fruits = {
    "apple": 130,
    "strawberries": 50
}

fruits["chocolate"]
```

Key	**Value**
apple	130
strawberries	50

```
fruits = {
    "apple": 130,
    "strawberries": 50
}

fruits["chocolate"]
```

Key	Value
apple	130
strawberries	50

KeyError

```
fruits = {
    "apple": 130,
    "strawberries": 50
}

try:
    fruits["chocolate"]
except KeyError:
    print("Not here!")
```

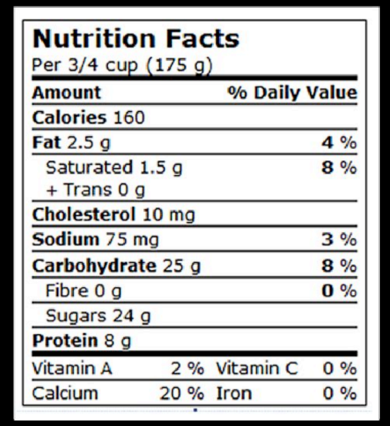
Key	Value
apple	130
strawberries	50

playback.py

faces.py

twttr.py

coke.py



Nutrition Facts
Per 3/4 cup (175 g)

Amount	**% Daily Value**
Calories 160	
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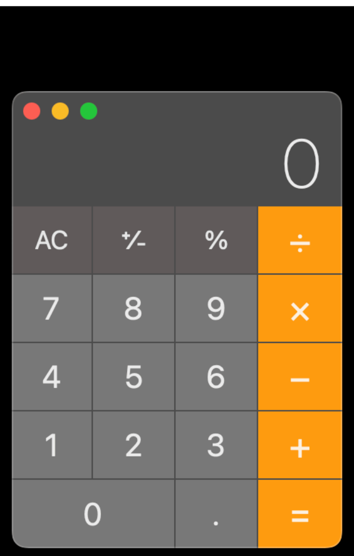
Cholesterol 10 mg	
Sodium 75 mg	**3 %**
Carbohydrate 25 g	**8 %**
Fibre 0 g	**0 %**
Sugars 24 g	
Protein 8 g	

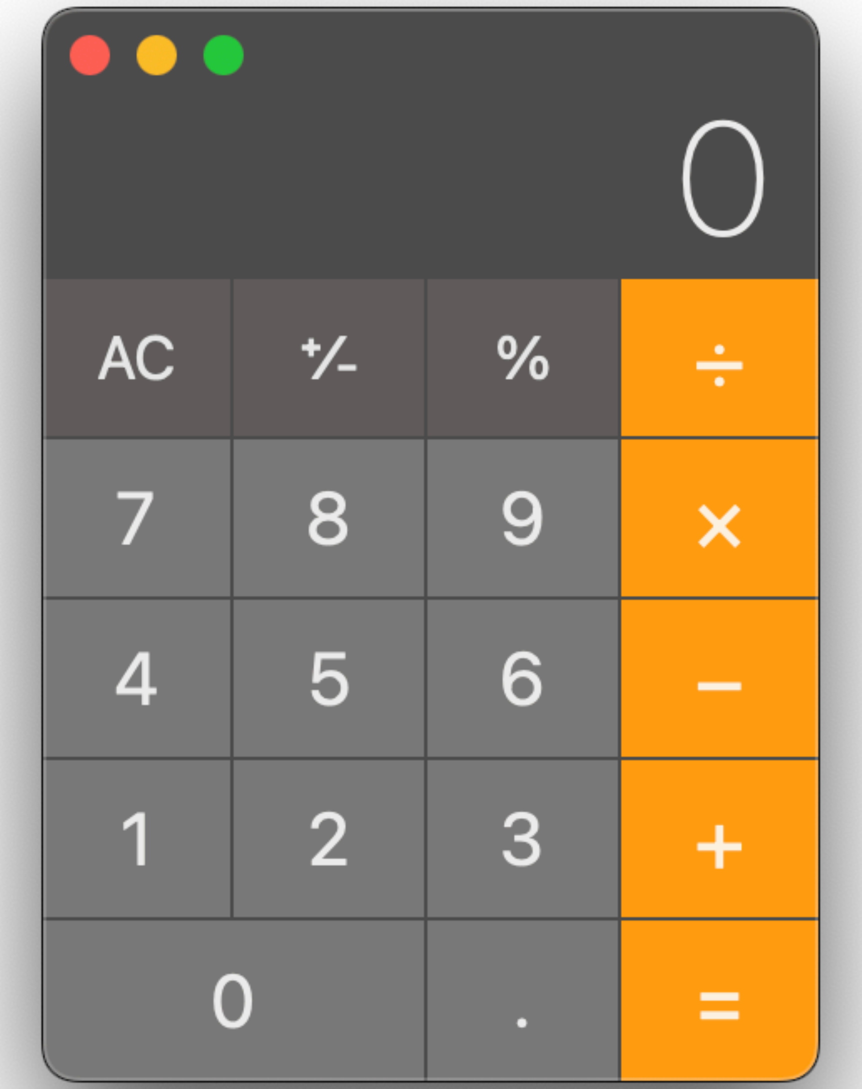
Vitamin A	2 %	Vitamin C	0 %
Calcium	20 %	Iron	0 %

nutrition.py

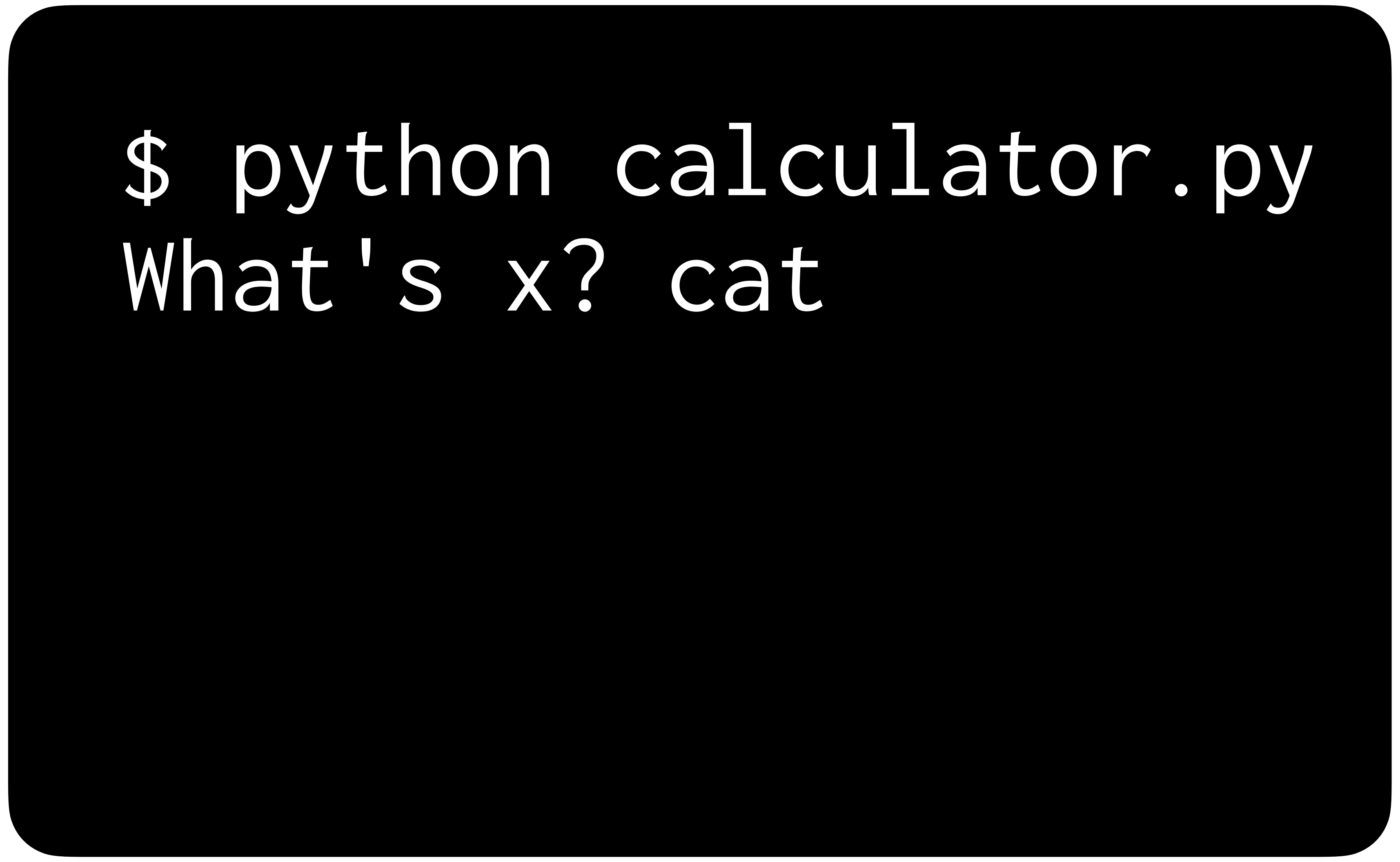


calculator.py

cases.py



Calculator



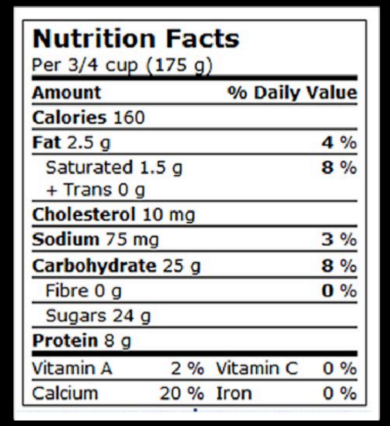
```
$ python calculator.py
What's x? cat
```

playback.py

faces.py

twttr.py

coke.py



Nutrition Facts
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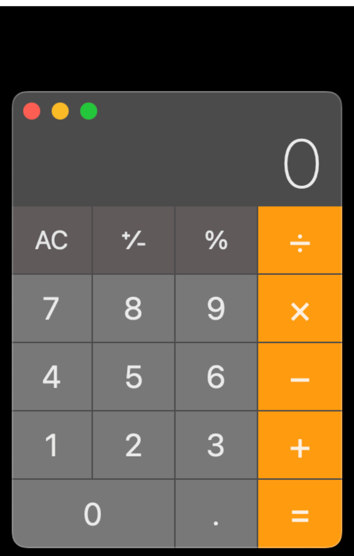
Carbohydrate 25 g	**8** %
Fibre 0 g	**0** %
Sugars 24 g	
Protein 8 g	
Vitamin A 2 %	Vitamin C 0 %
Calcium 20 %	Iron 0 %

nutrition.py



calculator.py

cases.py

Cases

cases.csv

```
caseId,term,chief,caseName,majVotes,minVotes

1946-002,1946,Vinson,CLEVELAND v. UNITED STATES,6,3

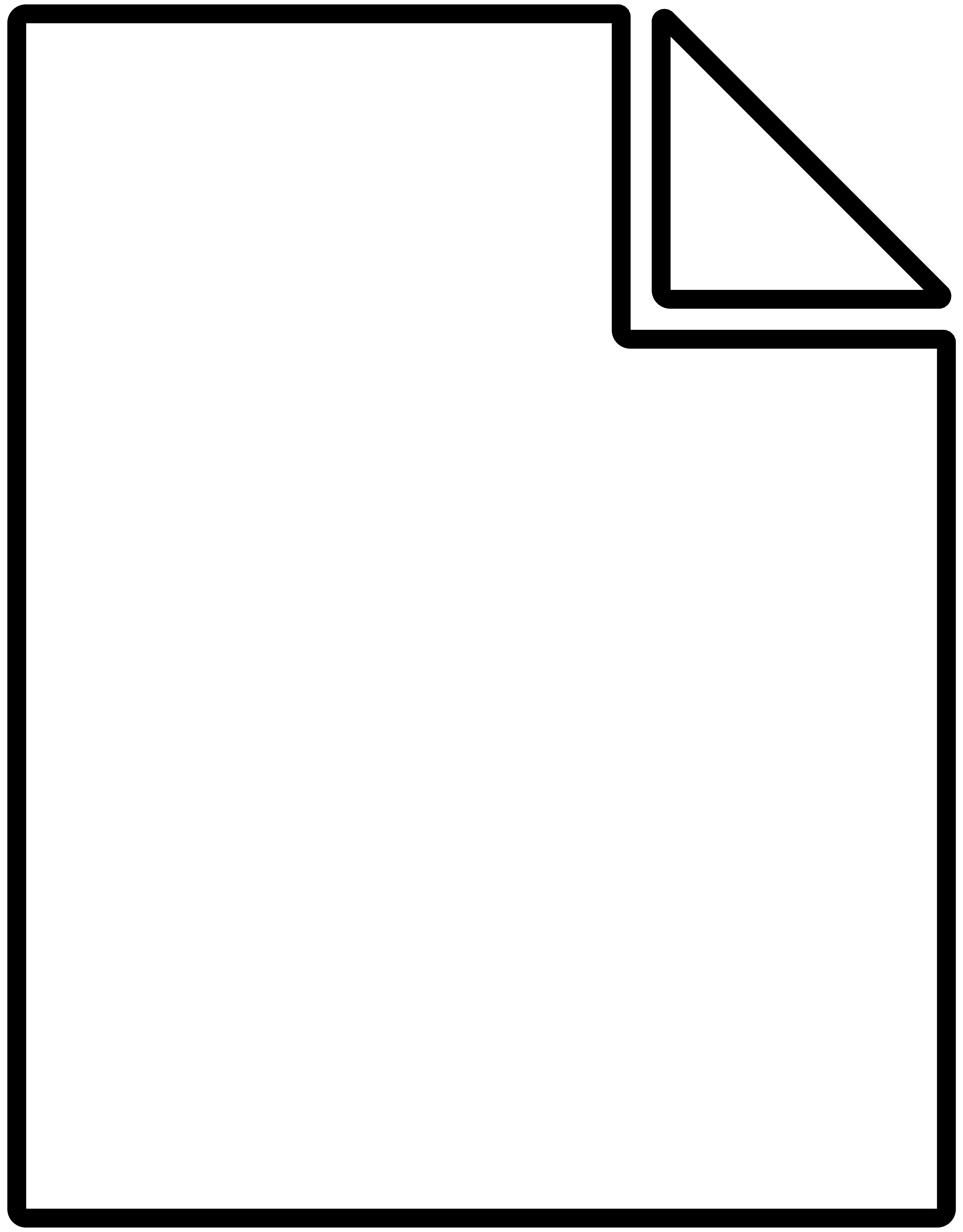
1946-003,1946,Vinson,CHAMPLIN REFINING CO. v. UNITED STATES ET AL.,5,4

1946-004,1946,Vinson,UNITED STATES v. ALCEA BAND OF TILLAMOOKS ET AL.,5,3

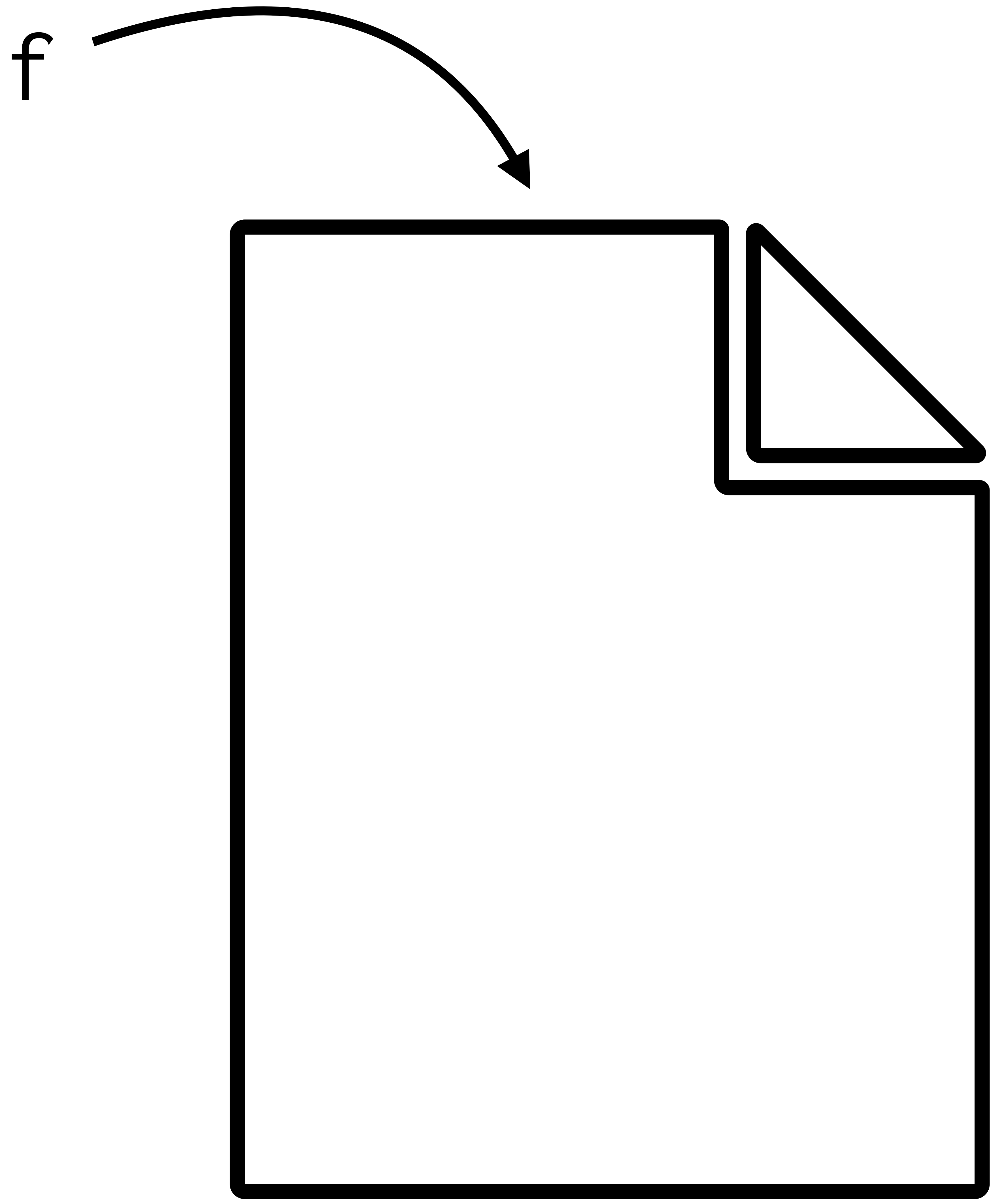
1946-005,1946,Vinson,"UNITED STATES v. HOWARD P. FOLEY CO., INC.",6,3

1946-006,1946,Vinson,RICHFIELD OIL CORP. v. STATE BOARD OF EQUALIZATION,7,1
```

```
with open("cases.csv") as f:
    contents = f.read()
```

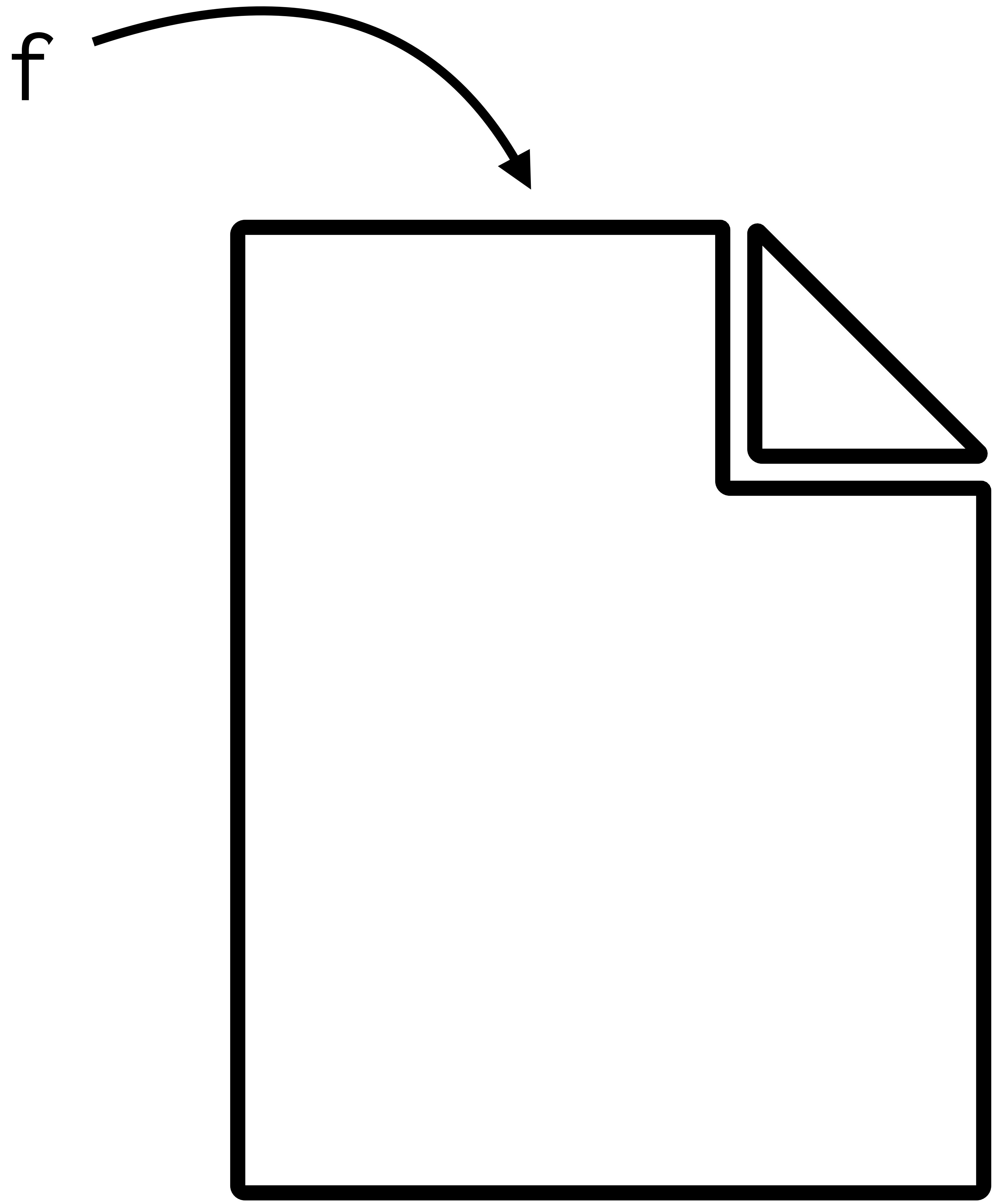


```
with open("cases.csv") as f:
    contents = f.read()
```



```
import csv

with open("cases.csv") as f:
    reader = csv.DictReader(f)
    for row in reader:
        ...
```



Ed