Programming Fundamentals

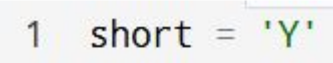
With Python

Chapter 1

01

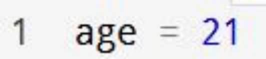
Variables

Character



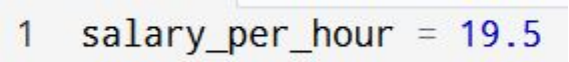
```
short = 'Y'
```

Integer



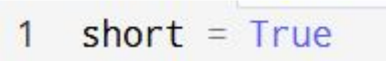
```
age = 21
```

Float



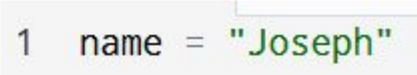
```
salary_per_hour = 19.5
```

Boolean



```
short = True
```

Strings



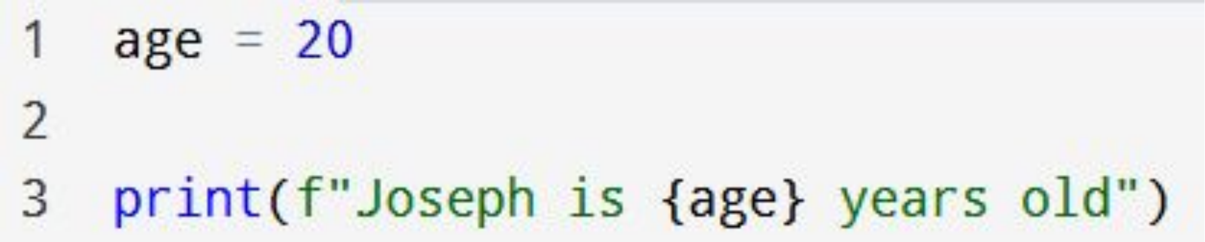
```
name = "Joseph"
```

02

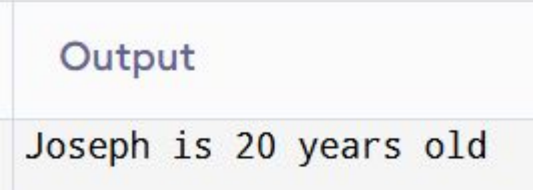
Print

Parametrization

Parametrization is when we want to use a variable to represent any input so that we can use it to get the output.



```python
age = 20

print(f"Joseph is {age} years old")
```

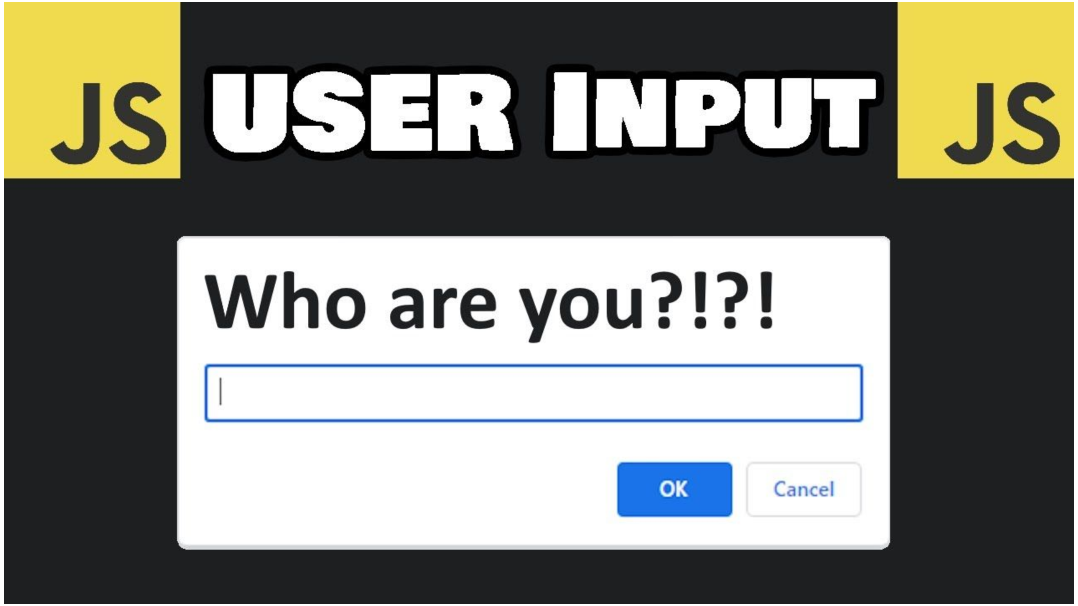


Output

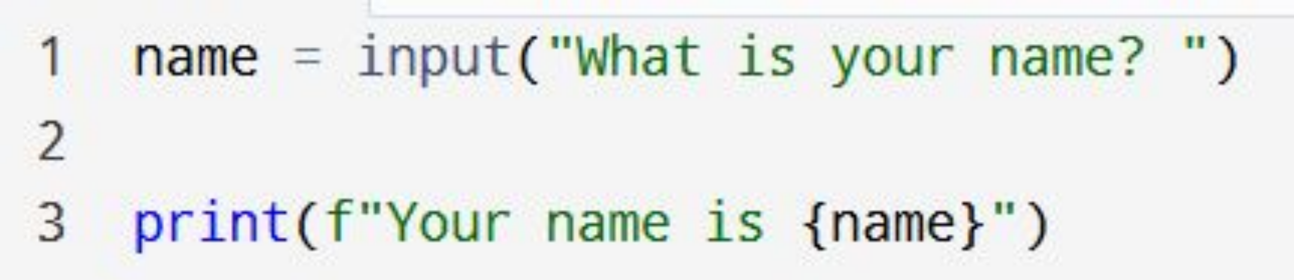
```
Joseph is 20 years old
```

03

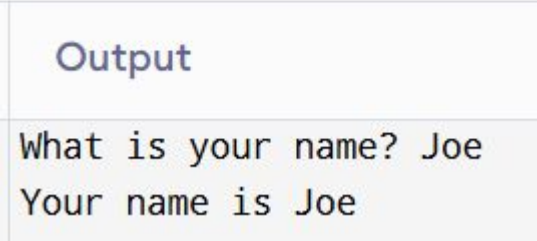
User Input



Who are you?!?!



```python
name = input("What is your name? ")

print(f"Your name is {name}")
```

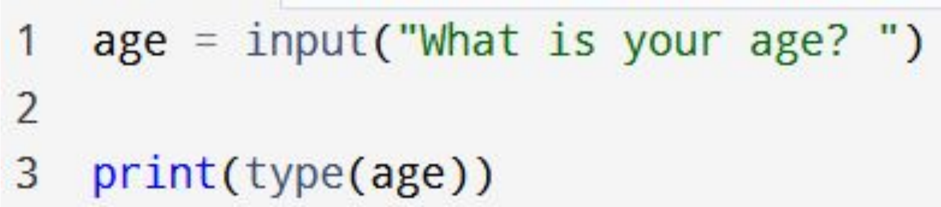


Output

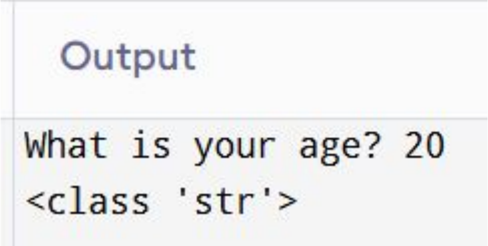
```
What is your name? Joe
Your name is Joe
```

04

Type Casting

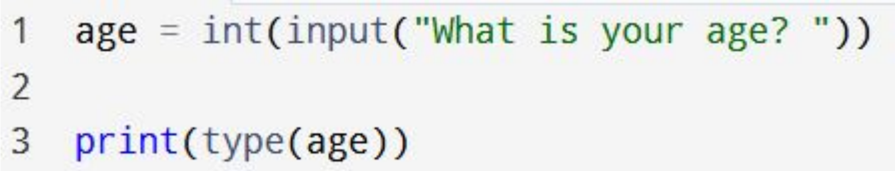


```python
age = input("What is your age? ")

print(type(age))
```

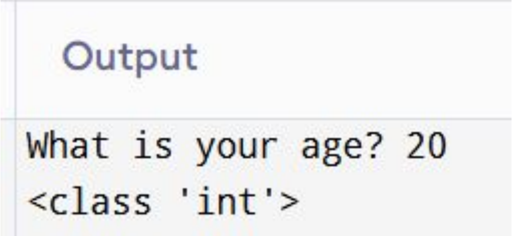


Output

```
What is your age? 20
<class 'str'>
```



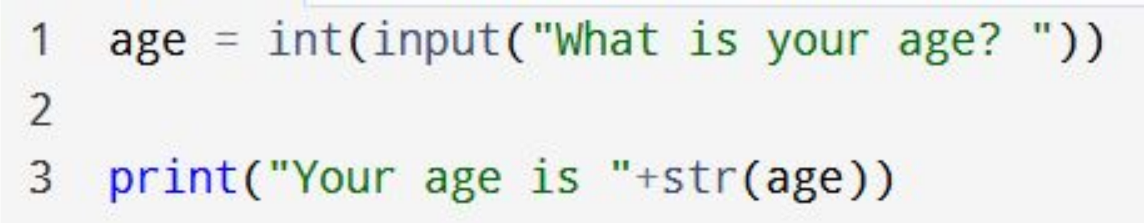
```python
age = int(input("What is your age? "))

print(type(age))
```



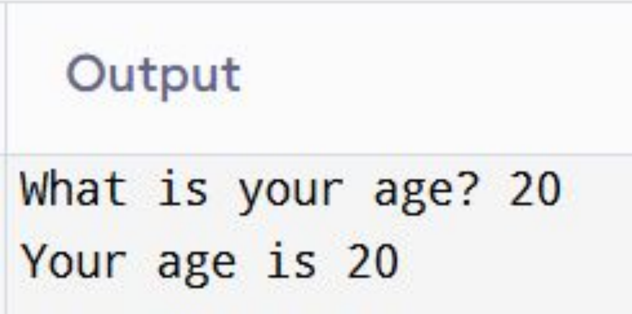
Output

```
What is your age? 20
<class 'int'>
```

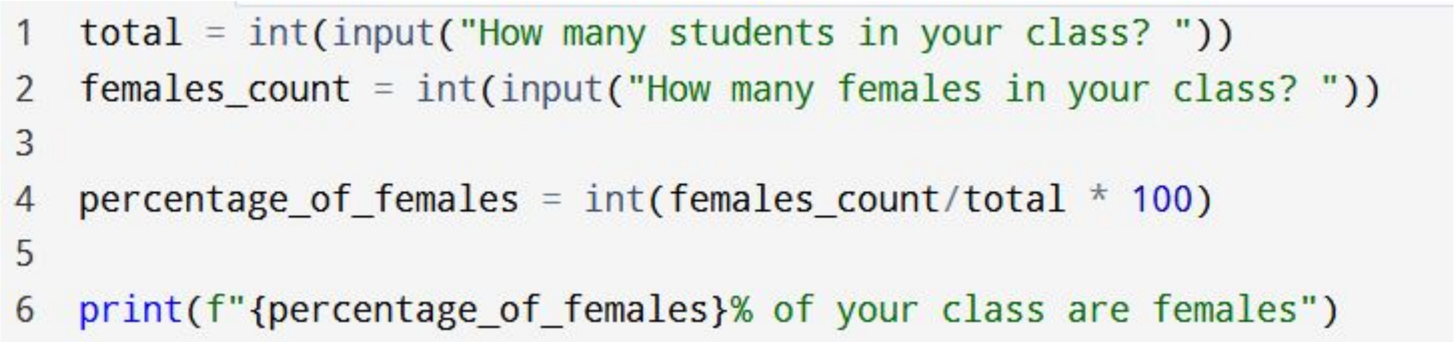
String Concatenation



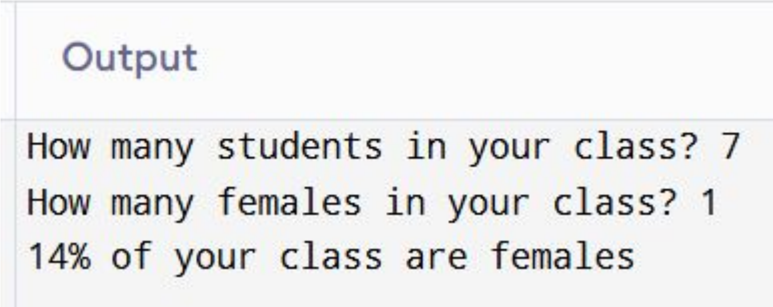
```python
age = int(input("What is your age? "))

print("Your age is "+str(age))
```



```
What is your age? 20
Your age is 20
```



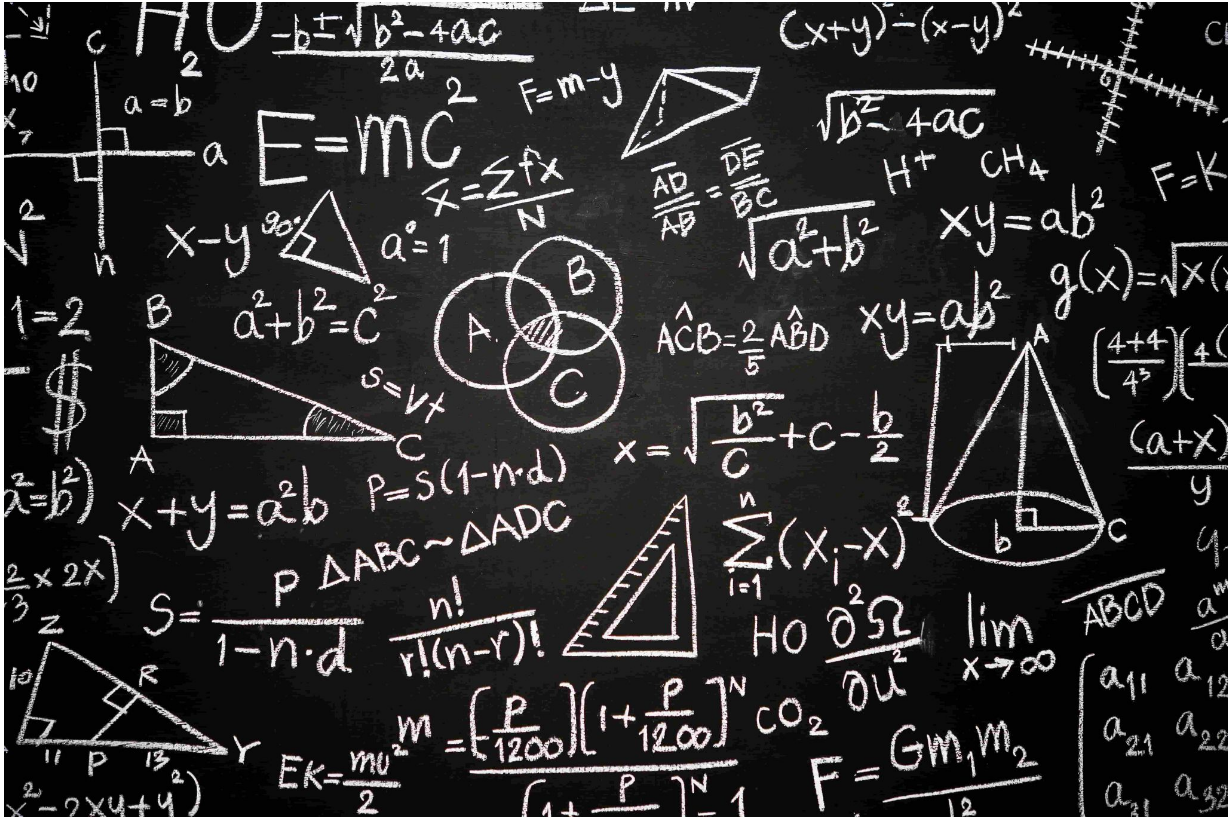
```python
total = int(input("How many students in your class? "))
females_count = int(input("How many females in your class? "))

percentage_of_females = int(females_count/total * 100)

print(f"{percentage_of_females}% of your class are females")
```

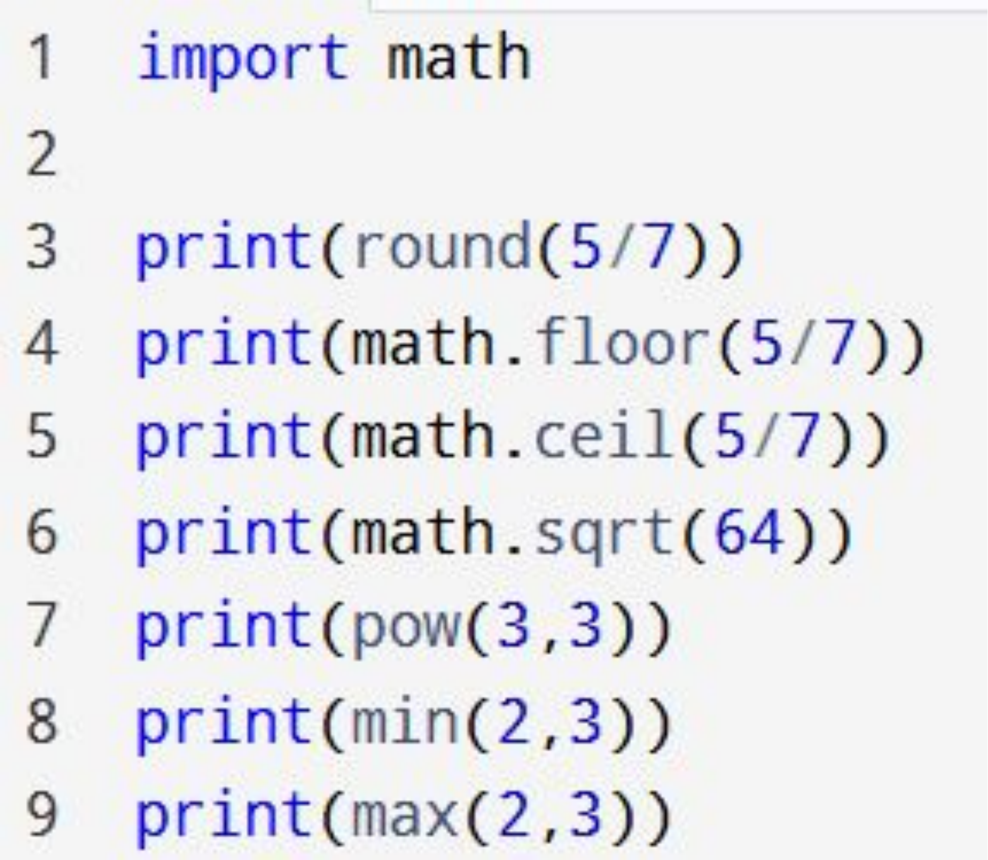


```
How many students in your class? 7
How many females in your class? 1
14% of your class are females
```

05

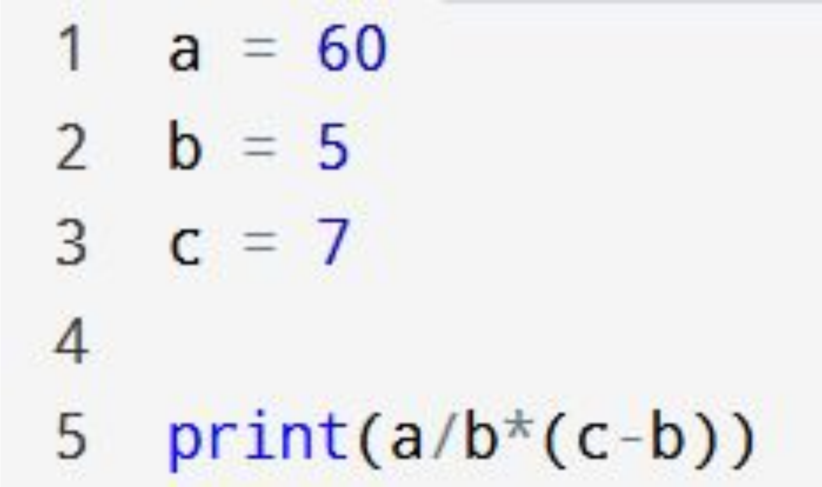
Math Functions



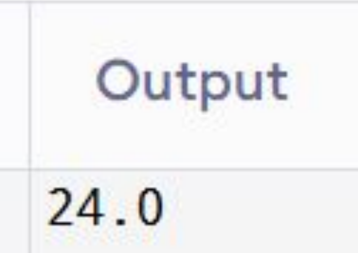


```python
import math

print(round(5/7))
print(math.floor(5/7))
print(math.ceil(5/7))
print(math.sqrt(64))
print(pow(3,3))
print(min(2,3))
print(max(2,3))
```

Don’t Forget Order of Operations (BEDMAS)

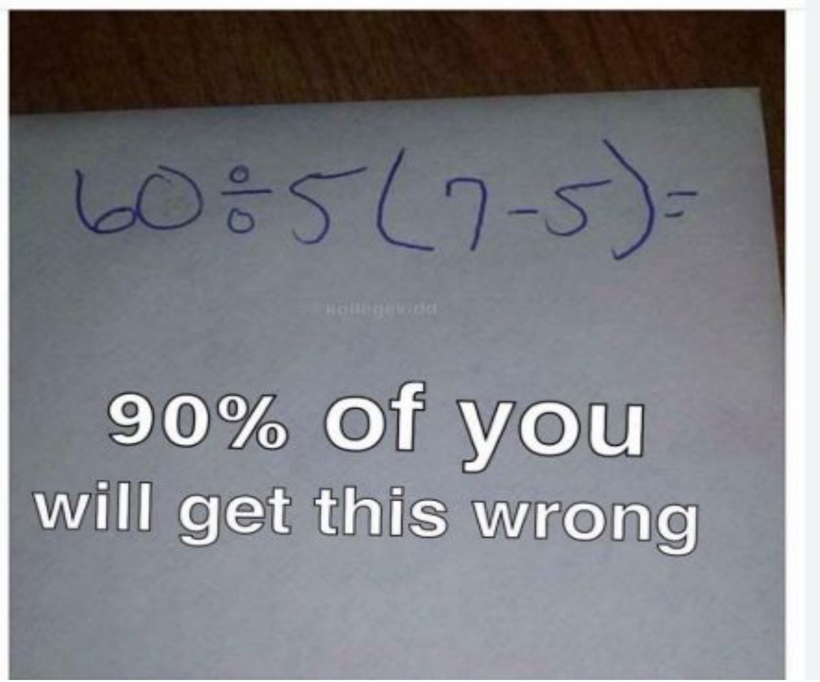


```python
a = 60
b = 5
c = 7

print(a/b*(c-b))
```



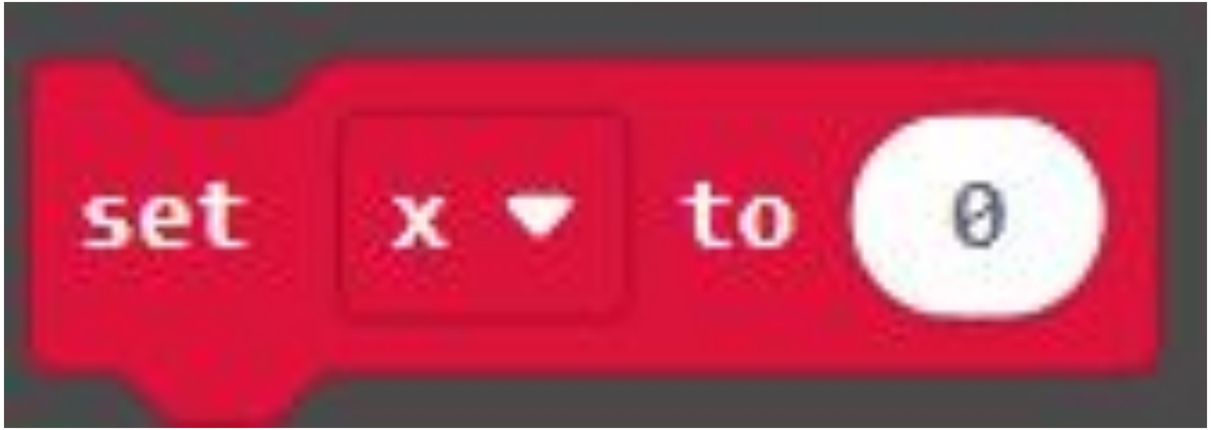
Output

```
24.0
```



06

Changing Variables

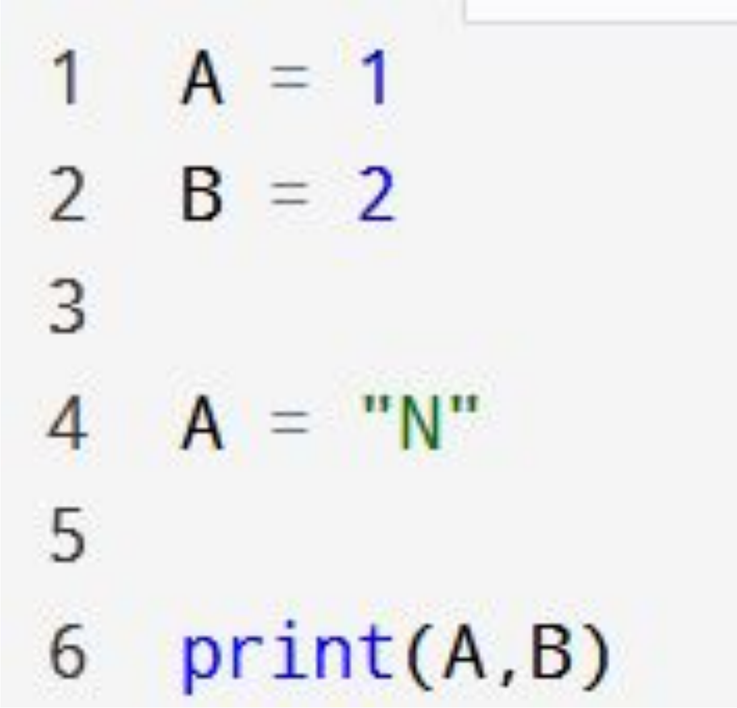


set x ▾ to 0

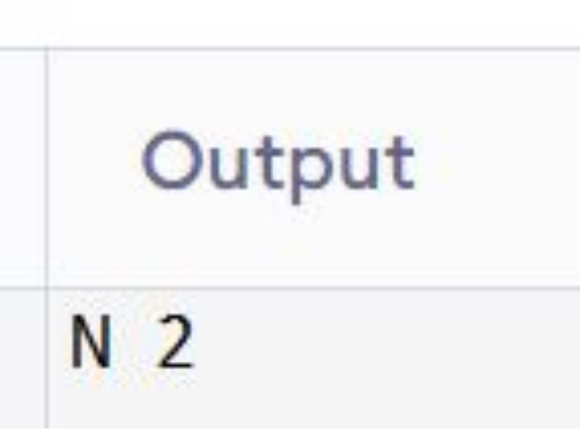
Variable Rules

1. You can change a value of any variable
2. You can set a variable equal to another variable
3. You can set a variable equal to itself (you get the old value)

A variable can change its type (but not recommended to do that)

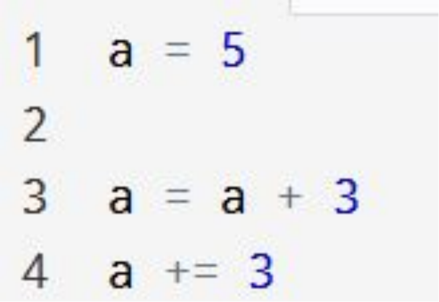


```python
A = 1
B = 2

A = "N"

print(A,B)
```



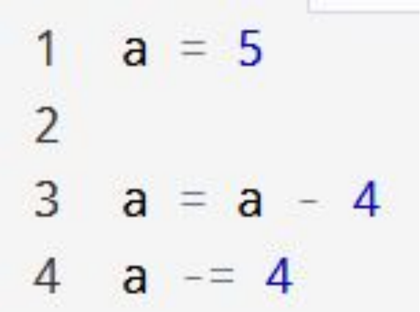
Output

```
N 2
```



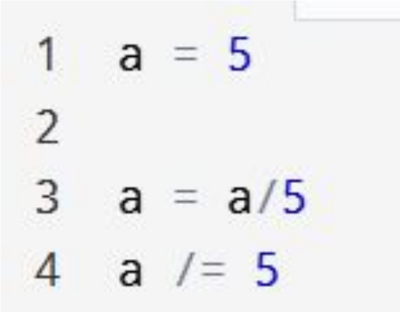
```
a = 5

a = a + 3
a += 3
```

Both will set a to 8



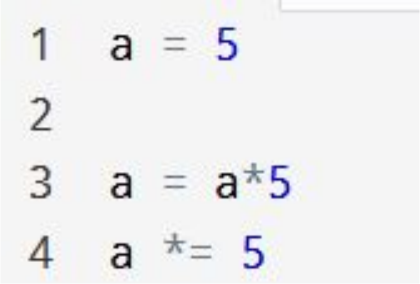
```
a = 5

a = a - 4
a -= 4
```

Both will set a to 1



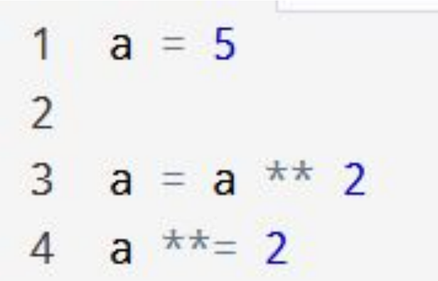
```
a = 5

a = a/5
a /= 5
```

Both will set a to 1



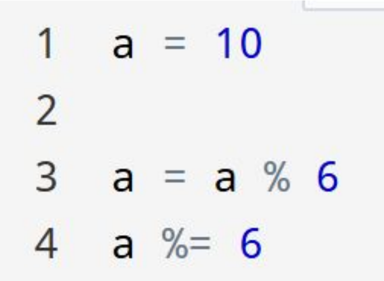
```
a = 5

a = a*5
a *= 5
```

Both will set a to 25



```
a = 5

a = a ** 2
a **= 2
```

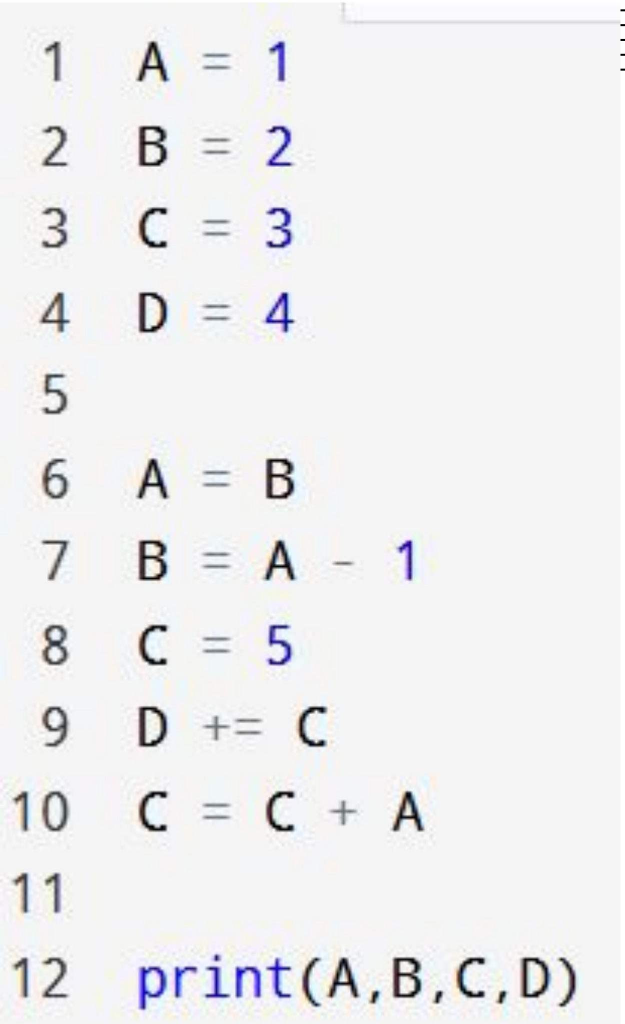
Both will set a to 25



```
a = 10

a = a % 6
a %= 6
```

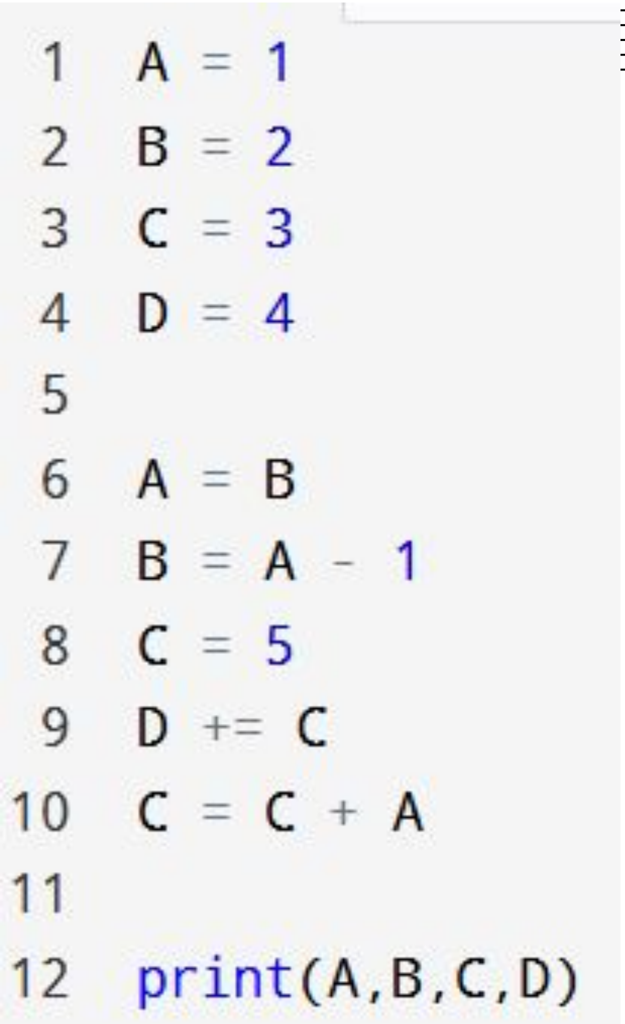
Both will set a to 4

The Variable Game



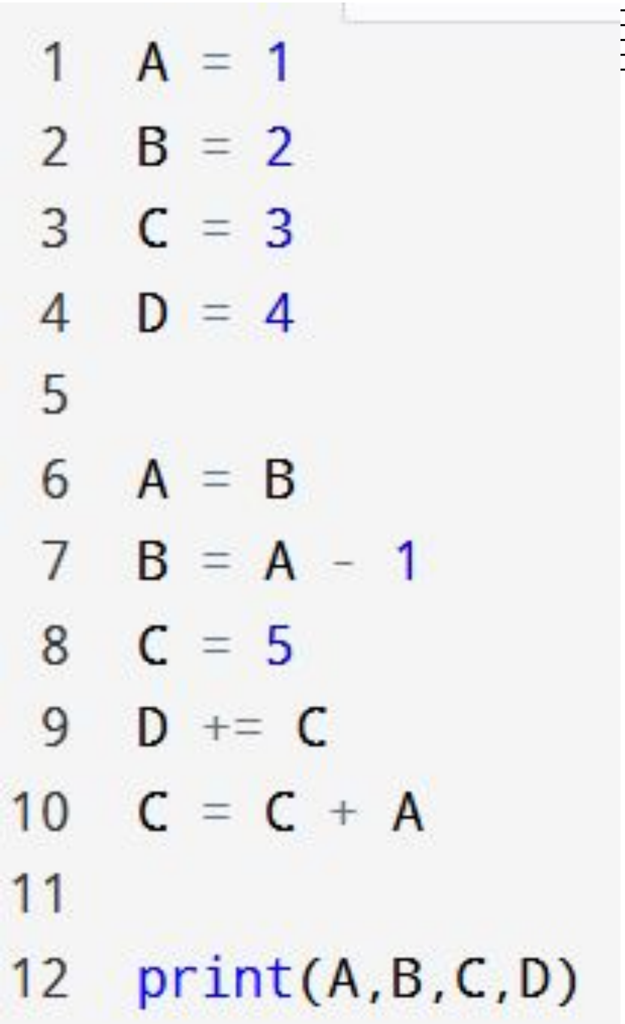
```
A = 1
B = 2
C = 3
D = 4

A = B
B = A - 1
C = 5
D += C
C = C + A

print(A,B,C,D)
```

Name	Value
A	1
B	2
C	3
D	4



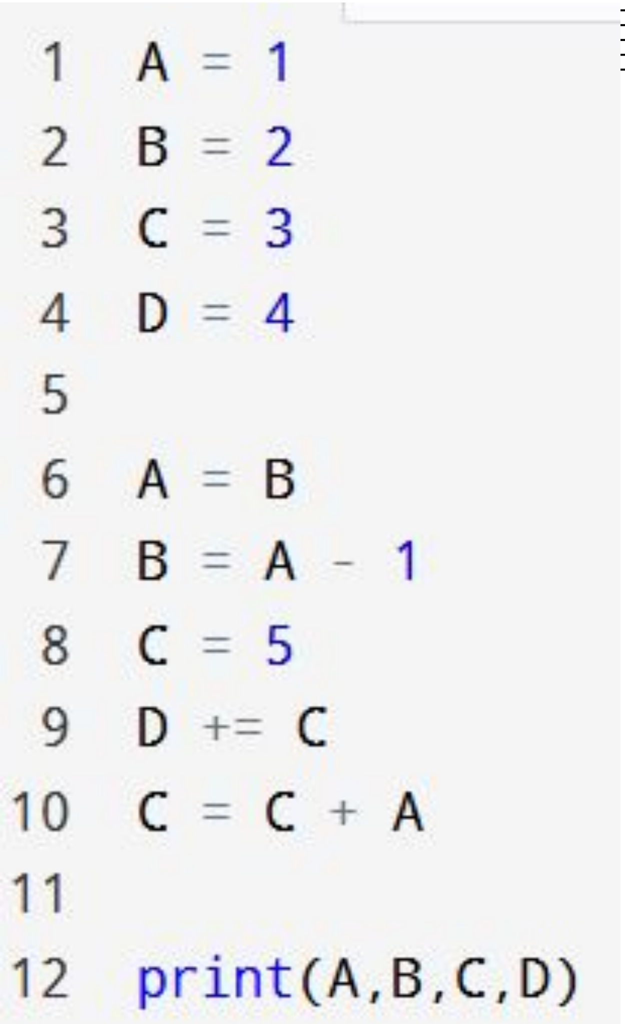
```
A = 1
B = 2
C = 3
D = 4

A = B
B = A - 1
C = 5
D += C
C = C + A

print(A,B,C,D)
```

Name	Value
A	2
B	2
C	3
D	4



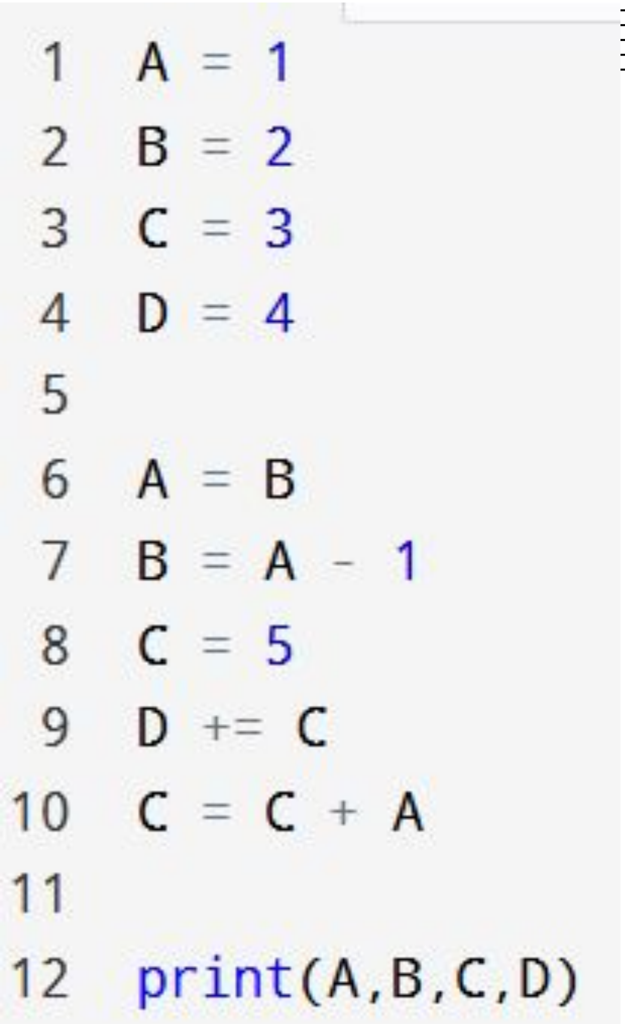
```
A = 1
B = 2
C = 3
D = 4

A = B
B = A - 1
C = 5
D += C
C = C + A

print(A,B,C,D)
```

Name	Value
A	2
B	1
C	3
D	4



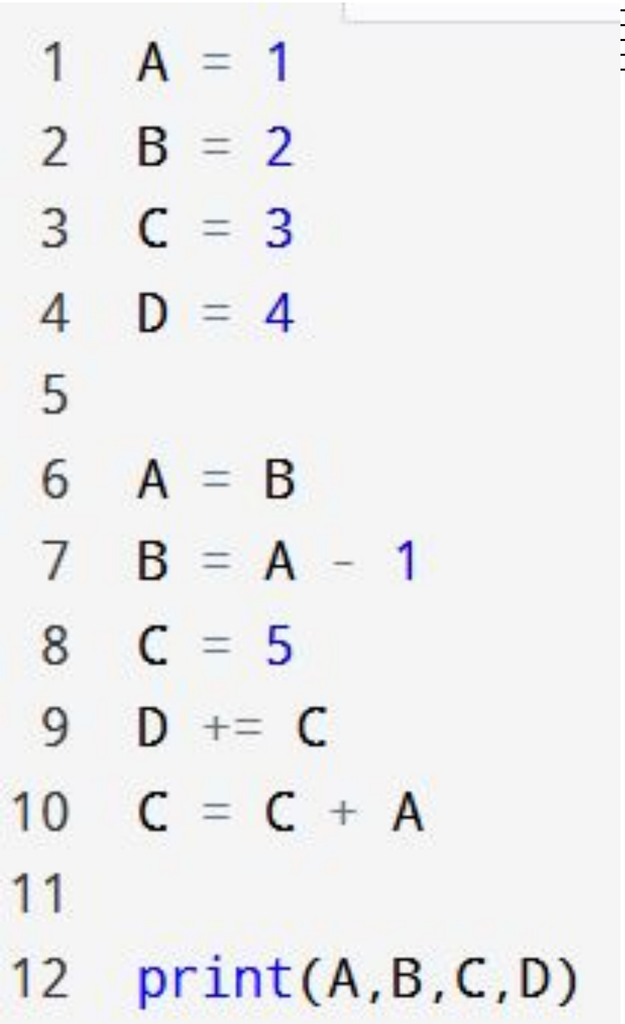
```
A = 1
B = 2
C = 3
D = 4

A = B
B = A - 1
C = 5
D += C
C = C + A

print(A,B,C,D)
```

Name	Value
A	2
B	1
C	5
D	4



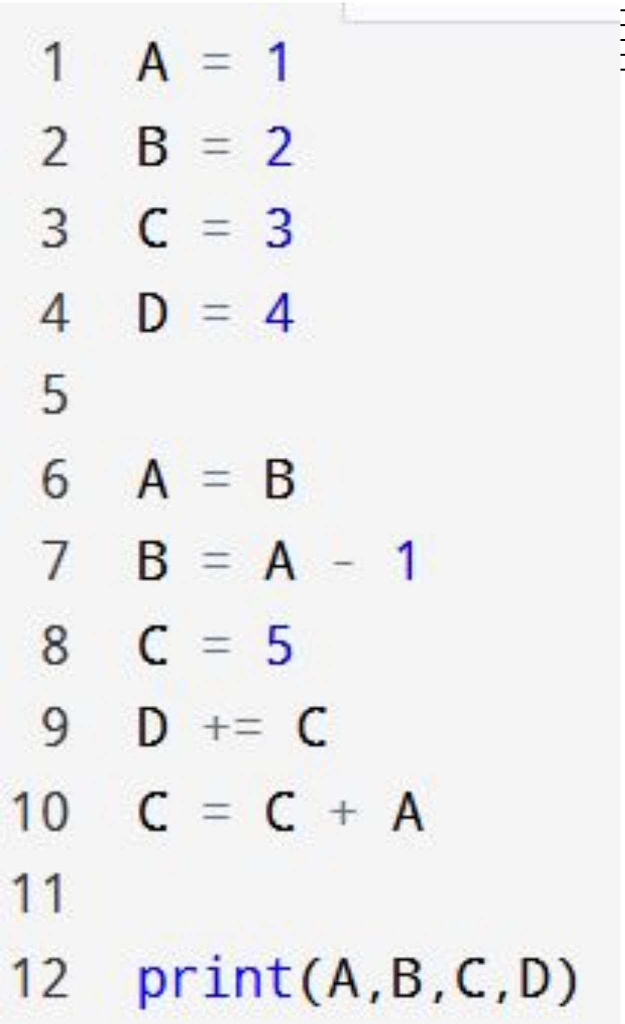
```
A = 1
B = 2
C = 3
D = 4

A = B
B = A - 1
C = 5
D += C
C = C + A

print(A,B,C,D)
```

Name	Value
A	2
B	1
C	5
D	9

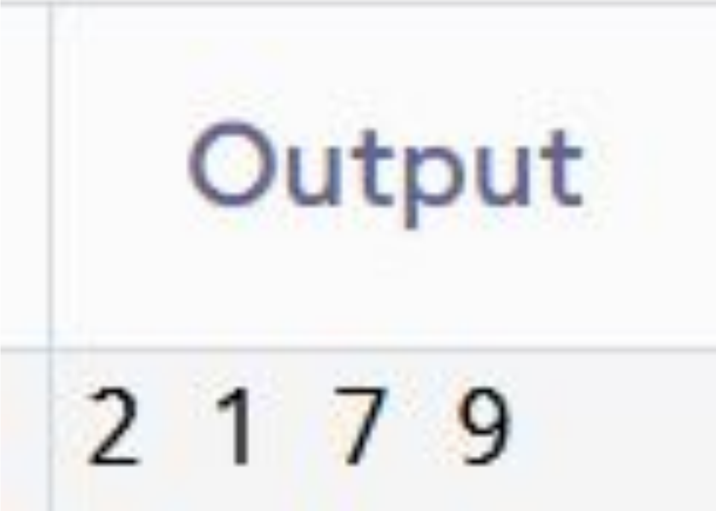


```
A = 1
B = 2
C = 3
D = 4

A = B
B = A - 1
C = 5
D += C
C = C + A

print(A,B,C,D)
```

Name	Value
A	2
B	1
C	7
D	9

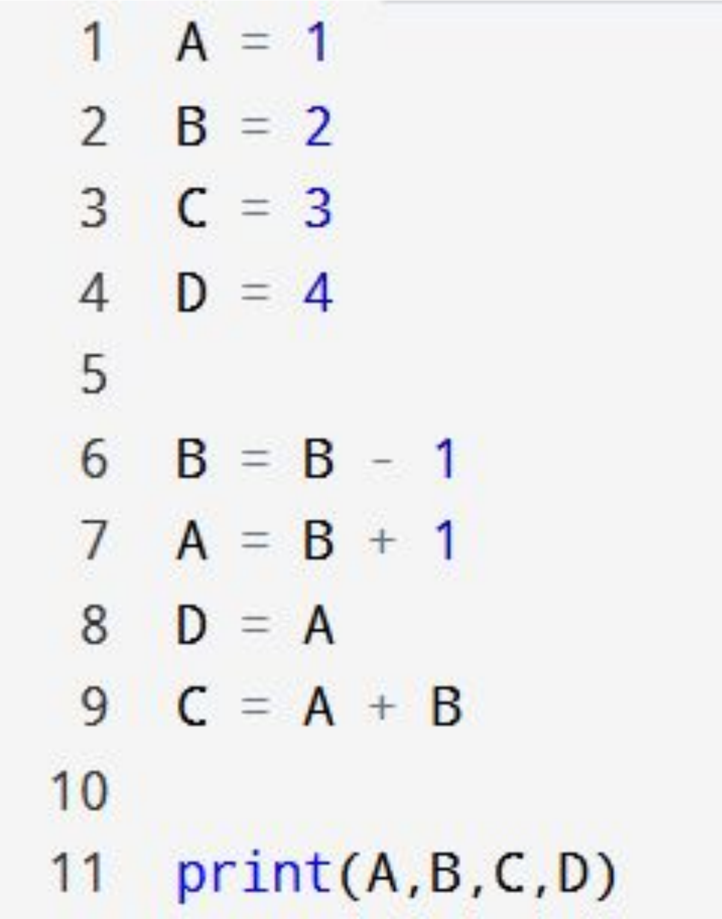


```python
A = 1
B = 2
C = 3
D = 4

A = B
B = A - 1
C = 5
D += C
C = C + A

print(A,B,C,D)
```

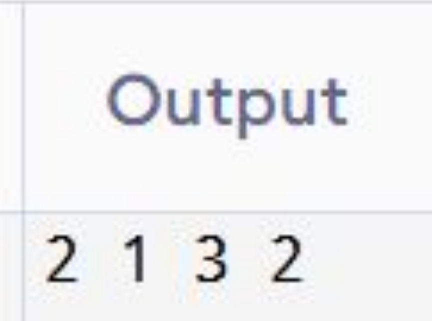


Output

```
2 1 7 9
```

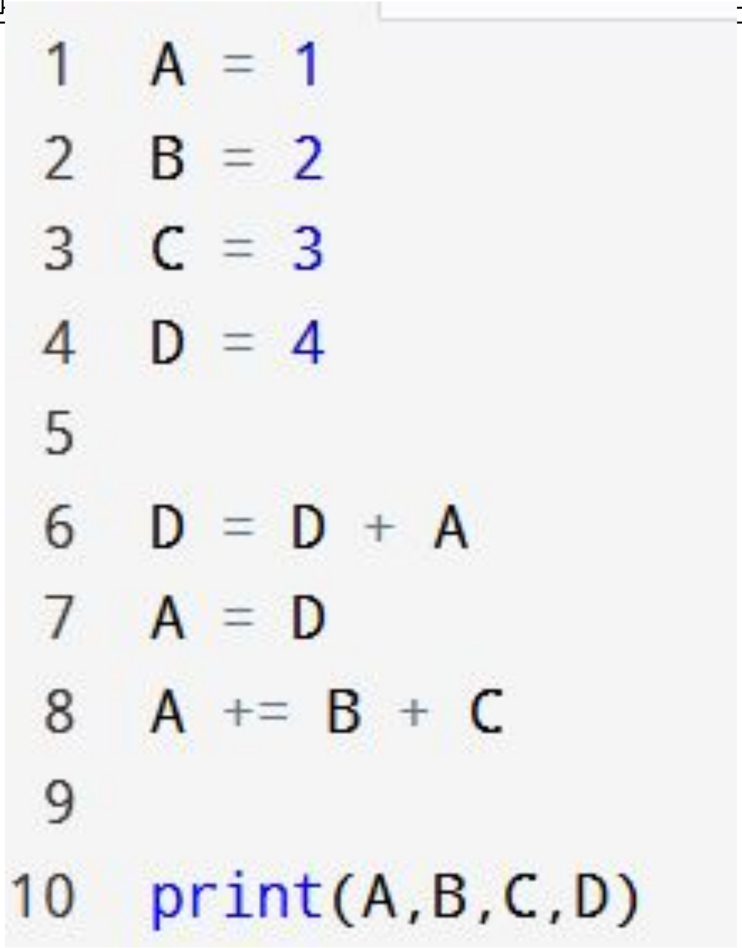


```
A = 1
B = 2
C = 3
D = 4

B = B - 1
A = B + 1
D = A
C = A + B

print(A,B,C,D)
```

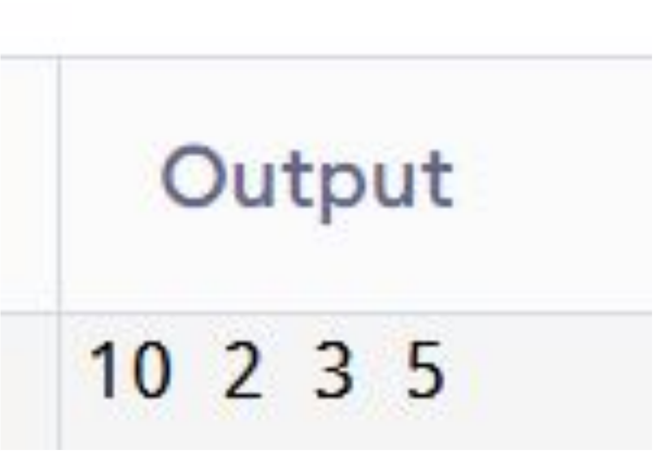


Output

```
2 1 3 2
```

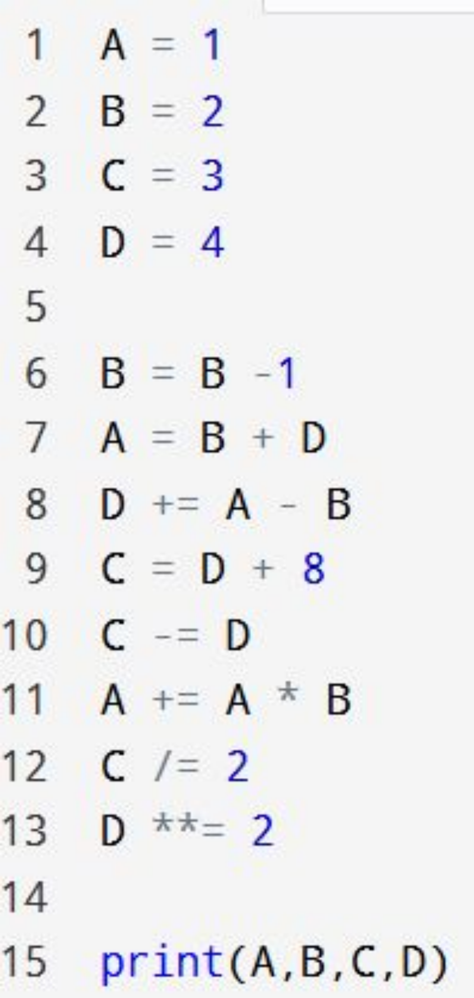


```python
A = 1
B = 2
C = 3
D = 4

D = D + A
A = D
A += B + C

print(A,B,C,D)
```

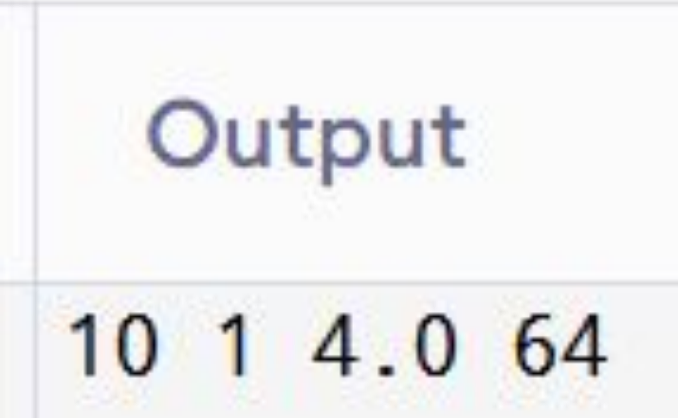


Output

```
10 2 3 5
```



```python
A = 1
B = 2
C = 3
D = 4

B = B -1
A = B + D
D += A - B
C = D + 8
C -= D
A += A * B
C /= 2
D **= 2

print(A,B,C,D)
```



Output

```
10 1 4.0 64
```

Exercise

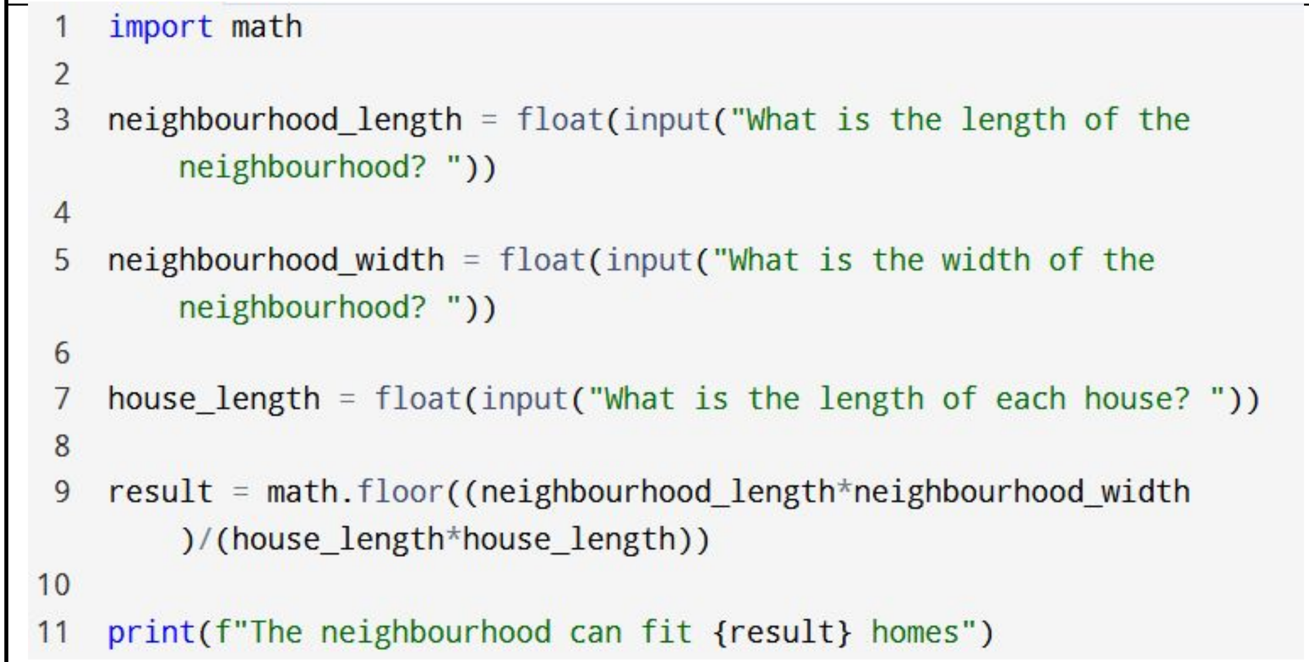
A large rectangular neighbourhood must be split evenly into square homes so that they can fit as many homes as possible. Write a python program that can calculate the max number of homes that can be built given the length of one square home and the width and length of a rectangular neighbourhood. **Note that the user must be the one inputting the values for these variables.**

Input: width and length of a rectangular farm, length of one square home
Output: number of homes that can be built in the neighbourhood

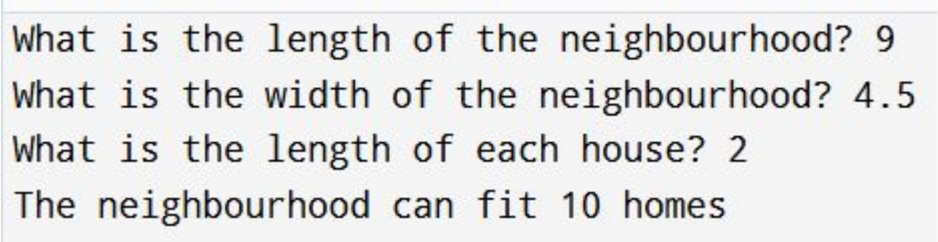
Sample Cases:

Input: rectangular neighbourhood is 4.5 by 9 meters. One house must be 2 by 2 meters.
Output: The neighbourhood can fit 10 homes.

Input: rectangular neighbourhood is 5.5 by 4.5 meters. One house must be 2.5 by 2.5 meters.
Output: The neighbourhood can fit 3 homes.



```python
import math

neighbourhood_length = float(input("What is the length of the neighbourhood? "))

neighbourhood_width = float(input("What is the width of the neighbourhood? "))

house_length = float(input("What is the length of each house? "))

result = math.floor((neighbourhood_length*neighbourhood_width)/(house_length*house_length))

print(f"The neighbourhood can fit {result} homes")
```



```
What is the length of the neighbourhood? 9
What is the width of the neighbourhood? 4.5
What is the length of each house? 2
The neighbourhood can fit 10 homes
```