

# Scopes in Python

```
1 x = 5
2
3 def fun():
4     x = 1
5
6 fun()
```

Global scope

```
1 → x = 5
2
3 def fun():
4     x = 1
5
6 fun()
```

Global scope

x = 5

```
1 x = 5
2
3 → def fun():
4     x = 1
5
6 fun()
```

Global scope

x = 5

fun = <function fun at 0x7f41cd733280>

```
1 x = 5
2
3 def fun():
4     x = 1
5
6 → fun()
```

Global scope

Local scope (fun)

x = 5

fun = <function fun at 0x7f41cd733280>

```
1 x = 5
2
3 def fun():
4     x = 1
5
6 fun()
```

Global scope

Local scope (fun)

x = 1

x = 5

fun = <function fun at 0x7f41cd733280>

```
1 x = 5
2
3 def fun():
4     x = 1
5
6 fun()
```

Global scope

x = 1

fun = <function fun at 0x7f41cd733280>

```
1  x = 5
2
3  def fun():
4      x = 1
5
6  fun()
```





Accessing global scope from local

```
1  x = 5
2
3  def fun():
4      |   print(x)
5
6  fun()
```

Global scope

x = 5

fun = <function fun at 0x7f41cd733280>

```
1 x = 5
2
3 def fun():
4     print(x)
5
6 → fun()
```

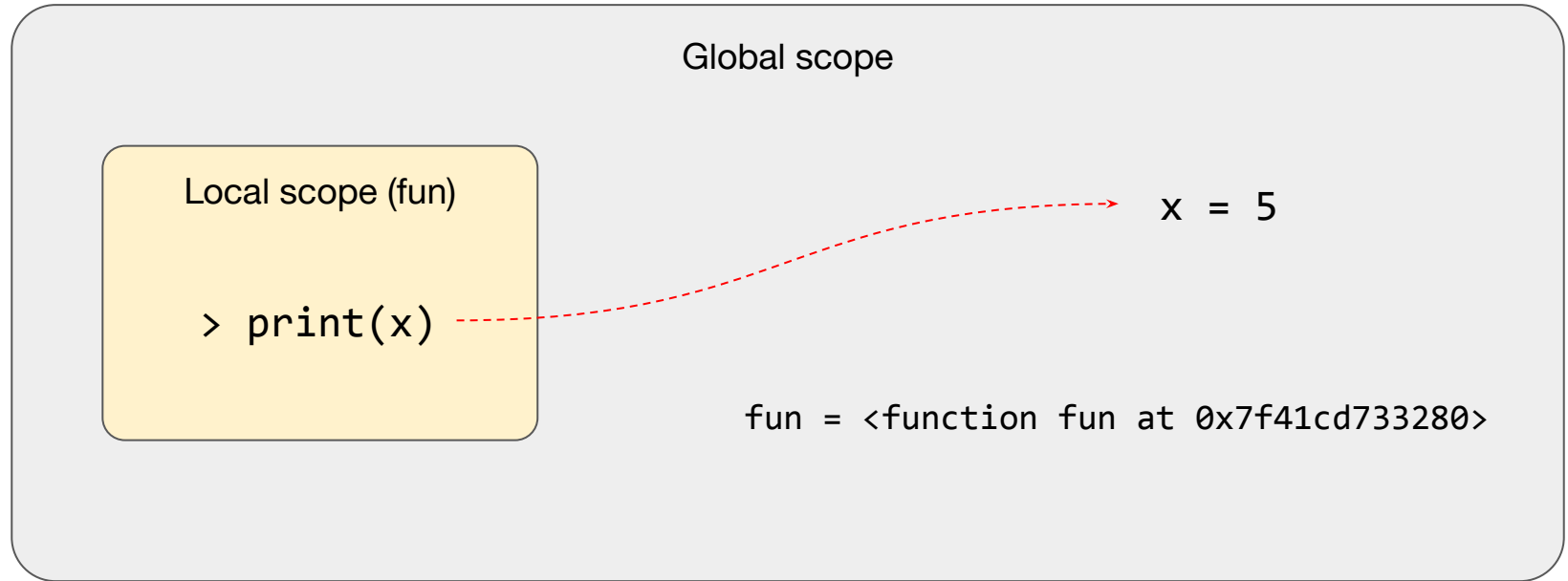
Global scope

Local scope (fun)

x = 5

fun = <function fun at 0x7f41cd733280>

```
1  x = 5
2
3  def fun():
4  → |   print(x)
5
6  fun()
```



```
1 x = 5
2
3 def fun():
4     print(x)
5
6 fun()
```

Global scope

x = 5

fun = <function fun at 0x7f41cd733280>

Trying to access local scope from global

```
1 def fun():  
2     x = 3  
3  
4 print(x)
```

Global scope

fun = <function fun at 0x7f41cd733280>

```
1  def fun():  
2  |    x = 3  
3  
4 → print(x)
```

Global scope

> print(x)

fun = <function fun at 0x7f41cd733280>



```
1 def fun():  
2     x = 3  
3  
4 → print(x)
```

Global scope

```
> print(x)
```

**NameError: name 'x' is not defined**

```
fun = <function fun at 0x7f41cd733280>
```

Local scopes are independent

```
1  def fun1():  
2      x = 1  
3  
4  def fun2():  
5      print(x)  
6  
7  fun1()  
8  fun2()
```

Global scope

fun1 = <function fun1 at 0x7f41cd733280>

fun2 = <function fun2 at 0x7fc1e59bfe50>

```
1  def fun1():  
2      x = 1  
3  
4  def fun2():  
5      print(x)  
6  
7  → fun1()  
8      fun2()
```

Global scope

Local scope (fun1)

fun1 = <function fun1 at 0x7f41cd733280>

fun2 = <function fun2 at 0x7fc1e59bfe50>

```
1  def fun1():  
2  →    x = 1  
3  
4  def fun2():  
5    print(x)  
6  
7  fun1()  
8  fun2()
```

Global scope

Local scope (fun1)

x = 1

fun1 = <function fun1 at 0x7f41cd733280>

fun2 = <function fun2 at 0x7fc1e59bfe50>

```
1  def fun1():  
2  |      x = 1  
3  
4  def fun2():  
5  |      print(x)  
6  
7  fun1()  
8  → fun2()
```

Global scope

fun1 = <function fun1 at 0x7f41cd733280>

fun2 = <function fun2 at 0x7fc1e59bfe50>

```
1  def fun1():  
2  |      x = 1  
3  
4  → def fun2():  
5  |     print(x)  
6  
7  fun1()  
8  fun2()
```

Global scope

Local scope (fun2)

fun1 = <function fun1 at 0x7f41cd733280>

fun2 = <function fun2 at 0x7fc1e59bfe50>

```
1  def fun1():  
2      x = 1  
3  
4  def fun2():  
5      print(x)  
6  
7  fun1()  
8  fun2()
```

Global scope

Local scope (fun2)

> print(x)

fun1 = <function fun1 at 0x7f41cd733280>

fun2 = <function fun2 at 0x7fc1e59bfe50>



```
1 def fun1():  
2     x = 1  
3  
4 def fun2():  
5     print(x)  
6  
7 fun1()  
8 fun2()
```

Global scope

Local scope (fun2)

> print(x)

**NameError: name 'x' is not defined**

fun1 = <function fun1 at 0x7f41cd733280>

fun2 = <function fun2 at 0x7fc1e59bfe50>

Variable names from different scopes  
does not collide

```
1  x = 1
2  print(x)
3
4  def fun():
5      x = 2
6      print(x)
7
8  fun()
```

Global scope

```
1 → x = 1
2   print(x)
3
4   def fun():
5       | x = 2
6       | print(x)
7
8   fun()
```

Global scope

x = 1

```
1 x = 1
2 → print(x)
3
4 def fun():
5     x = 2
6     print(x)
7
8 fun()
```

Global scope

x = 1  
→  
> print(x)

```
1  x = 1
2  print(x)
3
4  → def fun():
5     |     x = 2
6     |     print(x)
7
8  fun()
```

Global scope

x = 1

fun = <function fun at 0x7f41cd733280>

```
1 x = 1
2 print(x)
3
4 def fun():
5     x = 2
6     print(x)
7
8 → fun()
```

Global scope

Local scope (fun)

x = 1

fun = <function fun at 0x7f41cd733280>

```
1  x = 1
2  print(x)
3
4  def fun():
5  →   x = 2
6     print(x)
7
8  fun()
```

Global scope

Local scope (fun)

x = 2

x = 1

fun = <function fun at 0x7f41cd733280>




```
1  x = 1
2  print(x)
3
4  def fun():
5      x = 2
6      print(x)
7
8  fun()
```

Global scope

Local scope (fun)

```
x = 2
> print(x)
```



x = 1

fun = <function fun at 0x7f41cd733280>

```
1 x = 1
2 print(x)
3
4 def fun():
5     x = 2
6     print(x)
7
8 fun()
```

Global scope

x = 1

fun = <function fun at 0x7f41cd733280>

Scopes can be nested

```
1 → def fun1():  
2     x = 1  
3  
4     def fun2():  
5         print(x)  
6  
7     fun2()  
8  
9 fun1()
```

Global scope

```
fun1 = <function fun1 at 0x7f41cd733280>
```

```
1  def fun1():
2      x = 1
3
4      def fun2():
5          print(x)
6
7      fun2()
8
9  → fun1()
```

Local scope (fun1)

Global scope

fun1 = <function fun1 at 0x7f41cd733280>

```
1  def fun1():
2      x = 1
3
4  →  def fun2():
5      |   print(x)
6
7      fun2()
8
9  fun1()
```

Local scope (fun1)

x = 1

fun2 = <function fun2  
at 0x7fc1e59bfe50>

Global scope

fun1 = <function fun1 at 0x7f41cd733280>

```
1  def fun1():
2      x = 1
3
4      def fun2():
5          print(x)
6
7  →  fun2()
8
9  fun1()
```

Local scope (fun1)

x = 1

fun2 = <function fun2  
at 0x7fc1e59bfe50>

Local scope (fun2)

Global scope

fun1 = <function fun1 at 0x7f41cd733280>

```
1 def fun1():
2     x = 1
3
4     def fun2():
5         print(x)
6
7     fun2()
8
9 fun1()
```

Local scope (fun1)

x = 1

fun2 = <function fun2  
at 0x7fc1e59bfe50>

Local scope (fun2)

> print(x)

Global scope

fun1 = <function fun1 at 0x7f41cd733280>



```
1  def fun1():
2      x = 1
3
4      def fun2():
5          print(x)
6
7      fun2()
8  →
9  fun1()
```

Local scope (fun1)


x = 1

fun2 = <function fun2  
at 0x7fc1e59bfe50>

Global scope

fun1 = <function fun1 at 0x7f41cd733280>

```
1  def fun1():
2      x = 1
3
4      def fun2():
5          print(x)
6
7      fun2()
8
9  fun1()
```



Global scope

```
fun1 = <function fun1 at 0x7f41cd733280>
```

# Quiz 2

```
1 → x = 1
2 def fun():
3     x = 2
4
5 fun()
6 print(x)
```

Global scope

x = 1

```
1 x = 1
2 → def fun():
3     | x = 2
4
5 fun()
6 print(x)
```

Global scope

x = 1

fun = <function fun at 0x7f41cd733280>

```
1 x = 1
2 def fun():
3     x = 2
4
5 → fun()
6 print(x)
```

Global scope

Local scope (fun)

x = 1

fun = <function fun at 0x7f41cd733280>

```
1 x = 1
2 def fun():
3     x = 2
4
5 fun()
6 print(x)
```

Global scope

x = 1

fun = <function fun at 0x7f41cd733280>

Local scope (fun)

x = 2

```
1 x = 1
2 def fun():
3     x = 2
4
5 fun()
6 → print(x)
```

Global scope

> print(x)  x = 1

fun = <function fun at 0x7f41cd733280>



# Quiz 3

```
1 → x = 1
2 def fun():
3     y = x
4     return y + 1
5
6 x = fun()
7 print(x)
```

Global scope

x = 1

```
1 x = 1
2 → def fun():
3     y = x
4     return y + 1
5
6 x = fun()
7 print(x)
```

Global scope

x = 1

fun = <function fun at 0x7f41cd733280>

```
1 x = 1
2 def fun():
3     y = x
4     return y + 1
5
6 → x = fun()
7 print(x)
```

Global scope

Local scope (fun)

x = 1

fun = <function fun at 0x7f41cd733280>

```
1  x = 1
2  def fun():
3  →    y = x
4      return y + 1
5
6  x = fun()
7  print(x)
```

Global scope

Local scope (fun)

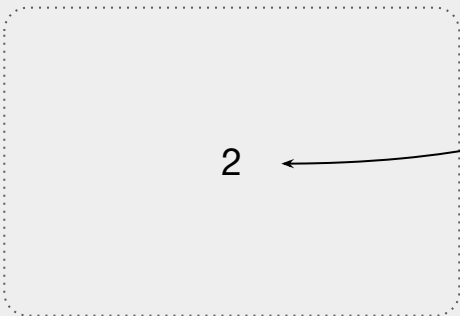
y

x = 1

fun = <function fun at 0x7f41cd733280>

```
1 x = 1
2 def fun():
3     y = x
4     return y + 1
5
6 x = fun()
7 print(x)
```

Global scope



2

x = 1

fun = <function fun at 0x7f41cd733280>

```
1 x = 1
2 def fun():
3     y = x
4     return y + 1
5
6 x = fun()
7 print(x)
```

Global scope

> print(x)  x = 2

fun = <function fun at 0x7f41cd733280>