

Adv. Functions

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Course Overview

Reminders

- Things are due. Check the calendar.

Bytecode: Looking under the hood

Python code:

```
def hello():  
    print("Hello, World!")
```

Bytecode:

```
0 LOAD_GLOBAL          0 (print)  
2 LOAD_CONST           1 ('Hello, World!')  
4 CALL_FUNCTION        1  
6 POP_TOP  
8 LOAD_CONST           0 (None)  
0 RETURN_VALUE
```

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→ interpreter

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You can view the bytecode of any function via the following:

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- Ⓑ There's generally crossover between these.
- Ⓒ Why bother? Because interpreting bytecode is faster.

Functions are Objects

Poll Question: Functions

What, if anything, gets printed to the screen after this code executes?

```
def add1(x): return x + 1
def mul2(x): return x * 2

x = 1
fns = [add1, mul2, mul2, print]
for f in fns:
    x = f(x)
```

- ☐ A 1
- ☐ B 4
- ☐ C 8
- ☐ D SyntaxError

Functions are Objects

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def foo(arg1, arg2):  
    if arg1 == arg2:  
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 - `foo.__code__.co_name` → The name of the function.
 - `foo.__code__.co_varnames` → A tuple of the names of variables present in the function object.

Namespace

Namespace

```
print('Initial global namespace: ')
print(globals())

my_var = "This is a variable"
print('\nCreated new variable')
print(globals())

def my_func():
    pass

print('\nCreated new function')
print(globals())
```

```
Initial global namespace:
{}

Created new variable
{'my_var': 'This is a variable'}

Created new function
{'my_func': <function my_func at 0x2349d4>,
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Go to example 1.

Scope

Poll Question: Function Scoping

What is produced by the following code?

```
my_var = 11
def change_my_var():
    my_var = 12

change_my_var()
print(my_var)
```

- ☐ A 11
- ☐ B 12
- ☐ C NameError
- ☐ D None

Poll Question: Function Scoping

What is produced by the following code?

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my_var = 11
def print_my_var():
    print(my_var)

print_my_var()
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- ❶ We have read access but not write access in the function's scope.
- ❷ How do we get write access to the global scope from within a function?

Poll Question: Function Scoping

What goes where the ?? is in order to (1) change the **global** value of `my_var` and (2) such that the user enters is printed to the screen when the code finishes running?

```
my_var = 11
def change_my_var(new_my_var):
    ??

change_my_var(int(input("Enter a new number: ")))
print(my_var)
```

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- Ⓓ NameError → An error that's generated when scope resolution fails. In otherwords, the name isn't in global or local namespace.
- Ⓔ A function will search it's local namespace first then the global namespace.

Poll Question: Function Scoping

What is produced by the following code?

```
thing = 11
def find_var(my_var):
    return "thing" in local()

print(find_var("thing"))
```

- ☐ A True
- ☐ B False
- ☐ C SyntaxError
- ☐ D NameError

Functions

Function Returns

How many objects are returned by the following function?

```
def return_first_and_lst(a_list):  
    return a_list[0], a_list[-1]
```

- ☐ A 1
- ☐ B 2
- ☐ C 3
- ☐ D None

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The above code is equivalent to this:

```
def return_first_and_lst(a_list):  
    return (a_list[0], a_list[-1])
```

Poll Question: Function Args and Mutability

What is the value of `x[0]` after this code executes:

```
def remove_first(a_list):  
    a_list = a_list[1:]  
  
x = [1, 2, 3, 4]  
remove_first(x)
```

- ☐ A 1
- ☐ B 2
- ☐ C 3
- ☐ D 4
- ☐ E Something else
- ☐ F An error occurs

Poll Question: Scope

What are the values of `w`, `x`, `y`, and `z` in the global scope after this code executes? What might we include in the line with the `??` to verify this?

```
x, y, z = (7, 5, 10)
def a_function(y):
    x = 2 * y
    return x * z

w = a_function(x)
??
```

- ☐ A 50, 7, 5, 10
- ☐ B 100, 10, 5, 10
- ☐ C 140, 7, 5, 10
- ☐ D 140, 14, 5, 10
- ☐ E `SyntaxError`