

UW CSE 190p Section

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Outlines

- Function: `id(.)`
- Mutable and immutable types
- Quiz walkthrough
- Homework question

Memory Visualization

Function: id(.)

- Return the “identity” of an object.
- Show the address of the object in memory.
- An integer (or long integer) which is guaranteed to be unique and constant for this object during its lifetime.

Immutability

- By immutability, we mean that whenever we start manipulating a immutable item, Python will spawn off another value for us.

Immutability Example

x = 300

y = 300

s = 'a string'

t = ('a', 'tuple')

Mutability

- For mutable types, we can actually change the value where it's stored in memory.

Mutability Example

- $l = [1, 2, 3]$

Mutable and Immutable Types

- Mutable types:
 - list, dictionary
- Immutable types:
 - Int, float, string, tuple

Quiz Walkthrough

Assume these definitions:

$$y = 4$$

```
def double(y):  
    return y + y
```

Evaluate the following expression. Show every step.

$$y + \text{double}(3 * y)$$

Quiz Walkthrough

`y = 3`

`def double(y):`

`return y + y`

`def quadruple1(y):`

`return double(double(y))`

`def quadruple2(y):`

`return double(y) + double(y)`

`def quadruple3(y):`

`return y + y + y + y`

`double(y) + quadruple1(double(y) + y)`

Quiz Walkthrough

`y = 3`

```
def double(y):
```

```
    return y + y
```

```
def quadruple1(y):
```

```
    return double(double(y))
```

```
def quadruple2(y):
```

```
    return double(y) + double(y)
```

```
def quadruple3(y):
```

```
    return y + y + y + y
```

```
double(y) + quadruple2(double(y) + y)
```

Quiz Walkthrough

`y = 3`

`def double(y):`

`return y + y`

`def quadruple1(y):`

`return double(double(y))`

`def quadruple2(y):`

`return double(y) + double(y)`

`def quadruple3(y):`

`return y + y + y + y`

`double(y) + quadruple3(double(y) + y)`

Homework/Quiz Questions?