

# Lecture 4

Topics to be covered:

Chapter 5:

5.1 Variables and assignments

5.2 Identifiers

5.3 Objects

5.4 Numeric types: Floating-point

5.5 Arithmetic expressions

# Variables and Assignments

Consider the following code fragment:

```
x = 10  
y = x+2  
z = x-y  
  
x = 5
```

*assignment  
statements*

An *identifier (name)*, is a sequence of letters (*a-z, A-Z*), underscores (*\_*), and digits (*0-9*), and must start with a letter or an underscore.

Python is case sensitive, meaning upper and lower case letters differ.

*variables  
(identifiers,  
names)*

myFriendsName

\_counter

n4

~~4toGo~~

~~it's~~

~~\$hk~~

~~p1-7h~~

# Variables, Assignments and Objects

Consider the following code fragment:

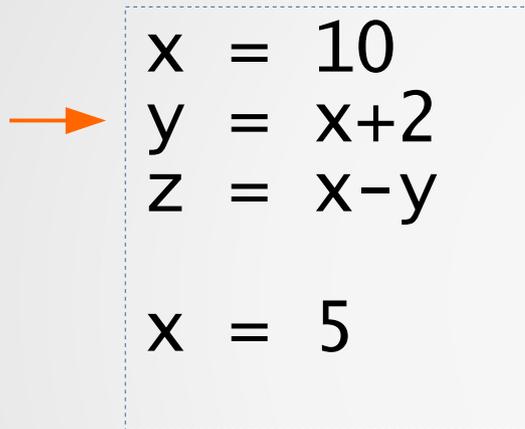


```
x = 10  
y = x+2  
z = x-y  
  
x = 5
```

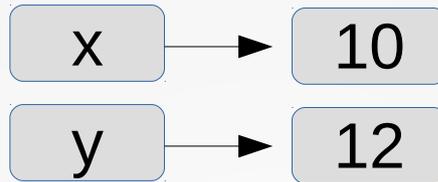


# Variables, Assignments and Objects

Consider the following code fragment:

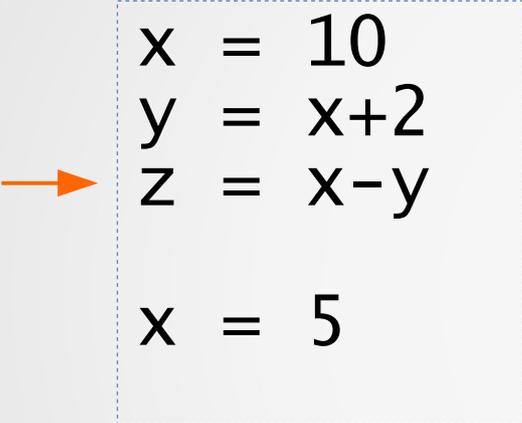


```
x = 10  
y = x+2  
z = x-y  
  
x = 5
```

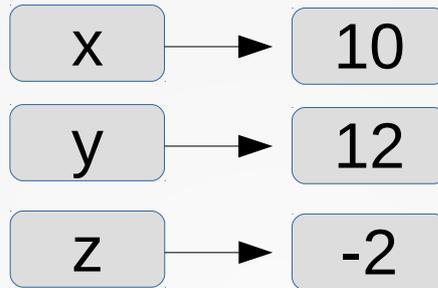


# Variables, Assignments and Objects

Consider the following code fragment:



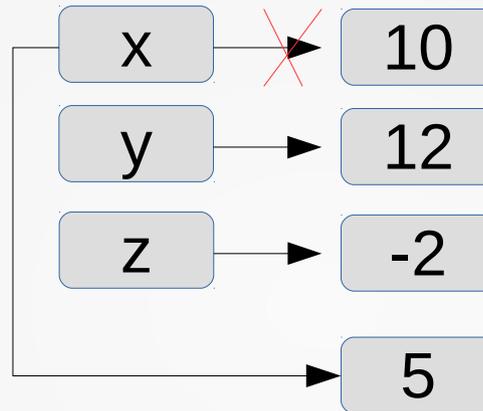
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x = 10  
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# Variables, Assignments and Objects

Consider the following code fragment:

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x = 10  
y = x+2  
z = x-y  
x = 5
```



# Variables, Assignments and Objects

Consider the following assignment statements:

$\text{Abra} = x + 2$

$\text{summ34\_iuy} = x+y+z+t$

$2 = x-3$

$x = x + 6$

$\text{zebra} = \text{"blue"}$

$5*x = 15 * y$

$y + 2 = 17$

Which ones of them are valid assignment statements?

# Variables, Assignments and Objects

Consider the following assignment statements:

`Abra = x + 2`

~~`2 = x - 3`~~

`zebra = "blue"`

~~`y + 2 = 17`~~

`summ34_iuy = x + y + z + t`

`x = x + 6`

~~`5 * x = 15 * y`~~

Which ones of them are valid assignment statements?

# Floating-point

A *floating-point number* is a real number, like 12.5, 0.0098, or -1023.17.

The term "*floating-point*" refers to the *decimal point* being able to appear anywhere ("float") in the number. Thus, float is a data type for floating-point numbers.

A floating-point literal is written with the fractional part even if that fraction is 0, as in 5.0, 10.0, or 197.0

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*Scientific notation* is useful for representing floating-point numbers that are much greater than or much less than 0.

0.00001 → 1.0e-5

10000000 =  $10^7$  → 1.0e7

1290000000000 =  $1.29 \times 10^9$  → 1.29e9

# Data types

By now we saw three types of data:

integers

1, 4, -16

real numbers  
(floating-point numbers)

1.2, -1.8, 0.54

strings

“Peter”, “Hello, how are you?”

Python has built-in function that allows us to get the type of an object: `type()`

# Data types

By now we saw three types of data:

integers	1, 4, -16	int
real numbers (floating-point numbers)	1.2, -1.8, 0.54	float
strings	"Peter", "Hello, how are you?"	string

Python has built-in function that allows us to get the type of an object: `type()`

## In-class practice:

Work on questions 1-2 in the **in-class practice** handout

# Arithmetic Expressions

We would like to be able to work with algebraic expressions such as

$$2x+5 \quad \text{or} \quad 3x^2-6y^3+1 \quad \text{or} \quad \frac{x-y}{x+2} \quad \dots$$

# Arithmetic Expressions

We would like to be able to work with algebraic expressions such as

$2x+5$     or     $3x^2-6y^3+1$     or     $\frac{x-y}{x+2}$     ....

Arithmetic operator	Description	Python operator
+	addition $x+5$	+
×	multiplication $2 \times a$	*
÷	multiplication $a \div 7$	/
-	subtraction $x-10$	-
$x^2$	exponent $x^2$	**

# Arithmetic Expressions

let's see some conversions from math to Python:

Algebraic expression in math	Algebraic expression in Python
$2x+5$	<code>2*x+5</code>
$3x^2-6y^3+1$	<code>3*x*x-6*y**3+1</code>
$(a+b+c) \div 3$	<code>(a+b+c)/3</code>
$y-2(x+9)$	<code>y-2*(x+9)</code>
$x^8$	<code>x**8</code>
$\frac{x-y}{x+2}$	<code>(x-y)/(x+2)</code>

## In-class practice:

Work on questions 3-4 in the **in-class practice** handout