Curso de nivelación de algoritmos

Taller - Clase 1

Lenguaje Python

- Python cuenta con un intérprete interactivo

```
$ python
```

Lenguaje Python

- Python cuenta con un intérprete interactivo

```
$ python
Python 2.7.6 (default, Mar 22 2014, 22:59:56)
[GCC 4.8.2] on linux2
Type "help", "copyright", "credits" or "license" for more information.

>>>
```

Lenguaje Python

- Python cuenta con un intérprete interactivo

```
$ python
Python 2.7.6 (default, Mar 22 2014, 22:59:56)
[GCC 4.8.2] on linux2
Type "help", "copyright", "credits" or "license" for more information.

>>> print "hola, mundo"
```

Lenguaje Python

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>>> print "hola, mundo"
hola, mundo
```

Lenguaje Python

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Python 2.7.6 (default, Mar 22 2014, 22:59:56)
[GCC 4.8.2] on linux2
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>>> print "hola, mundo"
hola, mundo
>>>
```

Lenguaje Python

- Python cuenta con un intérprete interactivo

```
$ python
Python 2.7.6 (default, Mar 22 2014, 22:59:56)
[GCC 4.8.2] on linux2
Type "help", "copyright", "credits" or "license" for more information.

>>> print "hola, mundo"
hola, mundo
>>> exit()
```

Lenguaje Python

- Python cuenta con un intérprete interactivo

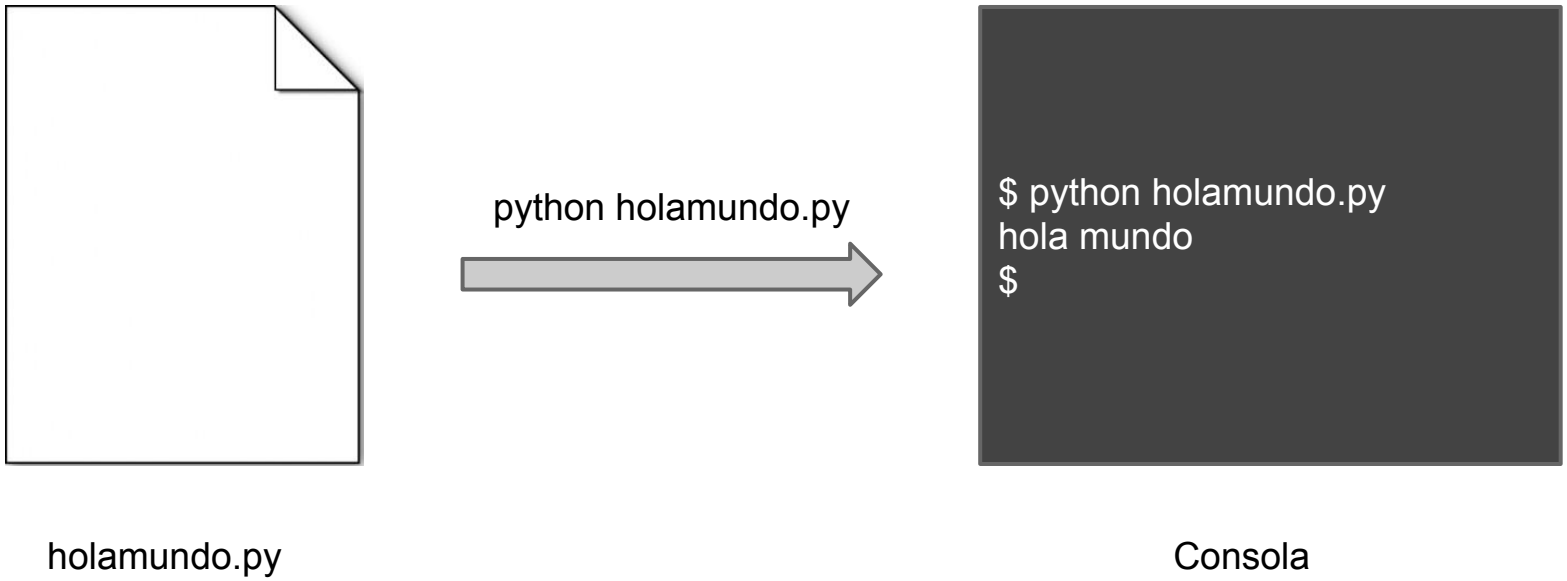
```
$ python
Python 2.7.6 (default, Mar 22 2014, 22:59:56)
[GCC 4.8.2] on linux2
Type "help", "copyright", "credits" or "license" for more information.

>>> print "hola, mundo"
hola, mundo
>>> exit()
$
```

Lenguaje Python

Archivo holamundo.py

```
#!/usr/bin/env python

print "hola mundo"
```

Python es un Lenguaje Interpretado



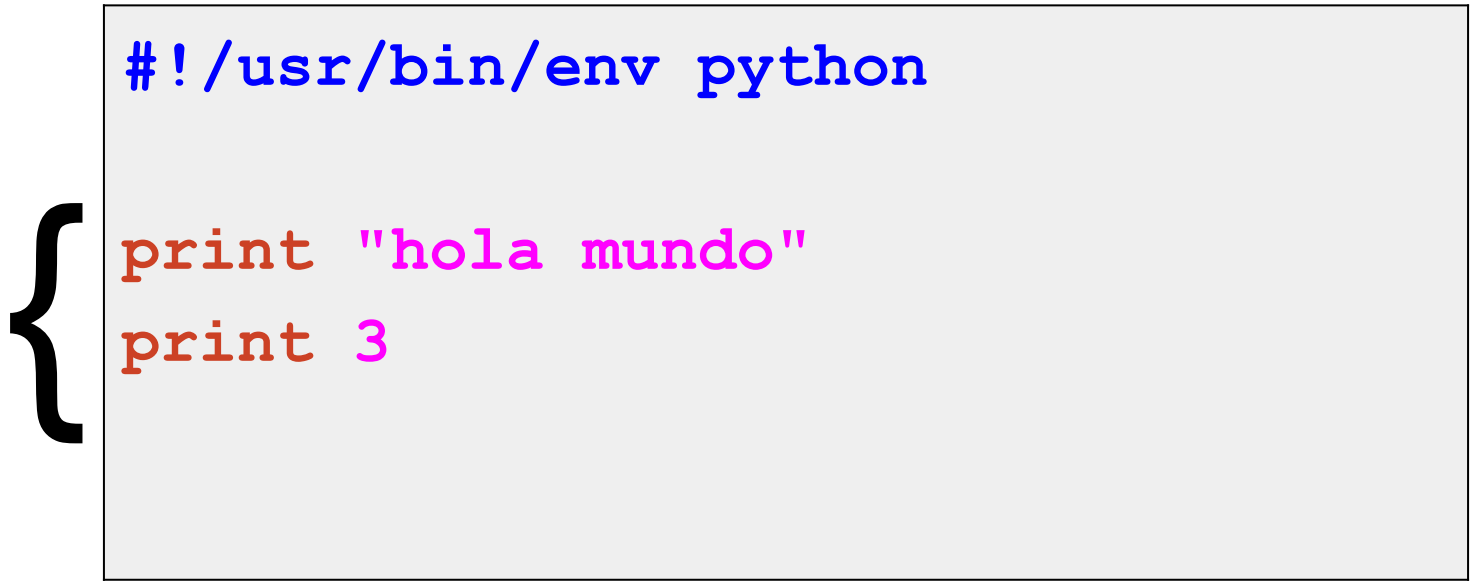
Programar en Python

Un programa en Python consta de una lista de instrucciones (entre otras cosas que veremos más adelante)

```
#!/usr/bin/env python

print "hola mundo"
print 3
```

Programar en Python

Contienen sentencias que especifican las operaciones de cálculo que se van a realizar



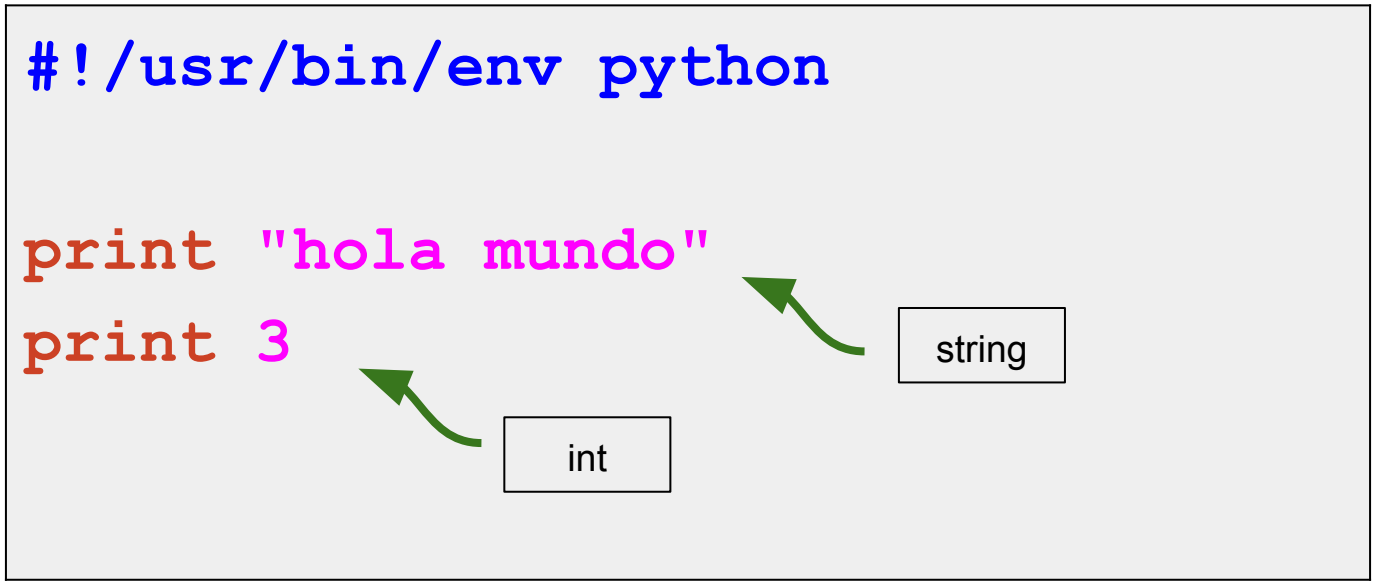
Programar en Python

El lenguaje provee diversas primitivas, como por ejemplo "print" que imprime por pantalla una expresión

```
#!/usr/bin/env python

print "hola mundo"
print 3
```

Programar en Python

Las expresiones que recibe el comando print pueden ser de distinto tipo: string, int, etc...



Python

Interprete interactivo

```
$ python
Python 2.7 (#1, Feb 28 2010, 00:02:06)
Type "help", "copyright", "credits" or "license" for more
information.
>>>
```

Evaluador de expresiones

```
>>> 2+2
```

Python

Interprete interactivo

```
$ python
Python 2.7 (#1, Feb 28 2010, 00:02:06)
Type "help", "copyright", "credits" or "license" for more
information.
>>>
```

Evaluador de expresiones

```
>>> 2+2
4
```

Python

Interprete interactivo

```
$ python
Python 2.7 (#1, Feb 28 2010, 00:02:06)
Type "help", "copyright", "credits" or "license" for more
information.
>>>
```

Evaluador de expresiones

```
>>> 2+2
4
>>> 2+2.0
```

Python

Interprete interactivo

```
$ python
Python 2.7 (#1, Feb 28 2010, 00:02:06)
Type "help", "copyright", "credits" or "license" for more
information.
>>>
```

Evaluador de expresiones

```
>>> 2+2
4
>>> 2+2.0
4.0
```

Python

Interprete interactivo

```
$ python
Python 2.7 (#1, Feb 28 2010, 00:02:06)
Type "help", "copyright", "credits" or "license" for more
information.
>>>
```

Evaluador de expresiones

```
>>> 2+2
4
>>> 2+2.0
4.0
>>> "hola"
```

Python

Interprete interactivo

```
$ python
Python 2.7 (#1, Feb 28 2010, 00:02:06)
Type "help", "copyright", "credits" or "license" for more
information.
>>>
```

Evaluador de expresiones

```
>>> 2+2
4
>>> 2+2.0
4.0
>>> "hola"
'hola'
```

Python

Interprete interactivo

```
$ python
Python 2.7 (#1, Feb 28 2010, 00:02:06)
Type "help", "copyright", "credits" or "license" for more
information.
>>>
```

Evaluador de expresiones

```
>>> 2+2
4
>>> 2+2.0
4.0
>>> "hola"
'hola'
>>> 'hola'
```

Python

Interprete interactivo

```
$ python
Python 2.7 (#1, Feb 28 2010, 00:02:06)
Type "help", "copyright", "credits" or "license" for more
information.
>>>
```

Evaluador de expresiones

```
>>> 2+2
4
>>> 2+2.0
4.0
>>> "hola"
'hola'
>>> 'hola'
'hola'
```

Python

Interprete interactivo

```
$ python
Python 2.7 (#1, Feb 28 2010, 00:02:06)
Type "help", "copyright", "credits" or "license" for more
information.
>>>
```

Evaluador de expresiones

```
>>> 2+2
4
>>> 2+2.0
4.0
>>> "hola"
'hola'
>>> 'hola'
'hola'
>>> "Hola," + " mundo"
```

Python

Interprete interactivo

```
$ python
Python 2.7 (#1, Feb 28 2010, 00:02:06)
Type "help", "copyright", "credits" or "license" for more
information.
>>>
```

Evaluador de expresiones

```
>>> 2+2
4
>>> 2+2.0
4.0
>>> "hola"
'hola'
>>> 'hola'
'hola'
>>> "Hola," + " mundo"
'Hola, mundo'
```

Python

Caracteres de escape

```
>>> 'doesn't'
```

Python

Caracteres de escape

```
>>> 'doesn't'
  File "<stdin>", line 1
    'doesn't'
           ^
SyntaxError: invalid syntax
```

Python

Caracteres de escape

```
>>> 'doesn't'
  File "<stdin>", line 1
    'doesn't'
           ^
SyntaxError: invalid syntax

>>> 'doesn\'t'
```

Python

Caracteres de escape

```
>>> 'doesn't'
  File "<stdin>", line 1
    'doesn't'
           ^
SyntaxError: invalid syntax

>>> 'doesn\'t'
"doesn't"
```

Python

Caracteres de escape

```
>>> 'doesn't'
  File "<stdin>", line 1
    'doesn't'
           ^
SyntaxError: invalid syntax

>>> 'doesn\'t'
"doesn't"

>>> "doesn't"
```

Python

Caracteres de escape

```
>>> 'doesn't'
  File "<stdin>", line 1
    'doesn't'
           ^
SyntaxError: invalid syntax

>>> 'doesn\'t'
"doesn't"

>>> "doesn't"
"doesn't"
```

Python

Variables

```
>>> base = 20
>>> altura = 5*9
>>> base * altura
```

Python

Variables

```
>>> base = 20
>>> altura = 5*9
>>> base * altura
900
```

Python

Variables

```
>>> base = 20
>>> altura = 5*9
>>> base * altura
900

>>> x = " cinco "
>>> '<' + x*5 + '>'
```

Python

Variables

```
>>> base = 20
>>> altura = 5*9
>>> base * altura
900

>>> x = " cinco "
>>> '<' + x*5 + '>'
'< cinco  cinco  cinco  cinco  cinco >'
```

Python

Variables

```
>>> base = 20
>>> altura = 5*9
>>> base * altura
900

>>> x = " cinco "
>>> '<' + x*5 + '>'
'< cinco  cinco  cinco  cinco  cinco >'

>>> x = "Hola"
>>> x[3]
```

Python

Variables

```
>>> base = 20
>>> altura = 5*9
>>> base * altura
900

>>> x = " cinco "
>>> '<' + x*5 + '>'
'< cinco  cinco  cinco  cinco  cinco >'

>>> x = "Hola"
>>> x[3]
'a'
```

Python

Variables

```
>>> base = 20
>>> altura = 5*9
>>> base * altura
900

>>> x = " cinco "
>>> '<' + x*5 + '>'
'< cinco  cinco  cinco  cinco  cinco >'

>>> x = "Hola"
>>> x[3]
'a'
>>> x[1:3]
```

Python

Variables

```
>>> base = 20
>>> altura = 5*9
>>> base * altura
900

>>> x = " cinco "
>>> '<' + x*5 + '>'
'< cinco  cinco  cinco  cinco  cinco >'

>>> x = "Hola"
>>> x[3]
'a'
>>> x[1:3]
'ol'
```

Python

Variables

```
>>> base = 20
>>> altura = 5*9
>>> base * altura
900

>>> x = " cinco "
>>> '<' + x*5 + '>'
'< cinco  cinco  cinco  cinco  cinco >'

>>> x = "Hola"
>>> x[3]
'a'
>>> x[1:3]
'ol'

>>> s = 'supercalifragilisticoespialidoso'
>>> len(s)
```

Python

Variables

```
>>> base = 20
>>> altura = 5*9
>>> base * altura
900

>>> x = " cinco "
>>> '<' + x*5 + '>'
'< cinco  cinco  cinco  cinco  cinco >'

>>> x = "Hola"
>>> x[3]
'a'
>>> x[1:3]
'ol'

>>> s = 'supercalifragilisticoespialidoso'
>>> len(s)
32
```

Python

Asignación simultánea

```
>>> x = y = 0
>>> x
```

Python

Asignación simultánea

```
>>> x = y = 0
>>> x
0
```

Python

Asignación simultánea

```
>>> x = y = 0
>>> x
0
>>> y
```

Python

Asignación simultánea

```
>>> x = y = 0
>>> x
0
>>> y
0
```

Python

Asignación simultánea

```
>>> x = y = 0
>>> x
0
>>> y
0

>>> x, y = 3, 4
>>> x
```

Python

Asignación simultánea

```
>>> x = y = 0
>>> x
0
>>> y
0

>>> x, y = 3, 4
>>> x
3
```

Python

Asignación simultánea

```
>>> x = y = 0
>>> x
0
>>> y
0

>>> x, y = 3, 4
>>> x
3
>>> y
```

Python

Asignación simultánea

```
>>> x = y = 0
>>> x
0
>>> y
0

>>> x, y = 3, 4
>>> x
3
>>> y
4
```

Python

Asignación simultánea

```
>>> x = y = 0
>>> x
0
>>> y
0

>>> x, y = 3, 4
>>> x
3
>>> y
4
```

Tipado dinámico

```
>>> x = 45
>>> x
```

Python

Asignación simultánea

```
>>> x = y = 0
>>> x
0
>>> y
0

>>> x, y = 3, 4
>>> x
3
>>> y
4
```

Tipado dinámico

```
>>> x = 45
>>> x
45
```

Python

Asignación simultánea

```
>>> x = y = 0
>>> x
0
>>> y
0

>>> x, y = 3, 4
>>> x
3
>>> y
4
```

Tipado dinámico

```
>>> x = 45
>>> x
45
>>> x = "Pirulo"
>>> x
```

Python

Asignación simultánea

```
>>> x = y = 0
>>> x
0
>>> y
0

>>> x, y = 3, 4
>>> x
3
>>> y
4
```

Tipado dinámico

```
>>> x = 45
>>> x
45
>>> x = "Pirulo"
>>> x
'Pirulo'
```

Python

Listas

```
>>> a = ['spam', 'huevos', 100, 1234]
>>> a
```

Python

Listas

```
>>> a = ['spam', 'huevos', 100, 1234]
>>> a
['spam', 'huevos', 100, 1234]
```

Python

Listas

```
>>> a = ['spam', 'huevos', 100, 1234]
>>> a
['spam', 'huevos', 100, 1234]

>>> a[0]


>>> a[3]


>>> a[-2]
```

Python

Listas

```
>>> a = ['spam', 'huevos', 100, 1234]
>>> a
['spam', 'huevos', 100, 1234]

>>> a[0]
'spam'

>>> a[3]
1234

>>> a[-2]
100
```

Python

Listas

```
>>> a = ['spam', 'huevos', 100, 1234]
>>> a
['spam', 'huevos', 100, 1234]

>>> a[0]
'spam'

>>> a[3]
1234

>>> a[-2]
100

>>> a[1:3]


>>> a[:2]
```

Python

Listas

```
>>> a = ['spam', 'huevos', 100, 1234]
>>> a
['spam', 'huevos', 100, 1234]

>>> a[0]
'spam'

>>> a[3]
1234

>>> a[-2]
100

>>> a[1:3]
['huevos', 100]

>>> a[:2]
['spam', 'huevos']
```

Python

Listas

```
>>> a = ['spam', 'huevos', 100, 1234]
>>> a
['spam', 'huevos', 100, 1234]

>>> a[0]
'spam'

>>> a[3]
1234

>>> a[-2]
100

>>> a[1:3]
['huevos', 100]

>>> a[:2]
['spam', 'huevos']

>>> a[:2] + ['panceta', 2*2]
```

Python

Listas

```
>>> a = ['spam', 'huevos', 100, 1234]
>>> a
['spam', 'huevos', 100, 1234]

>>> a[0]
'spam'

>>> a[3]
1234

>>> a[-2]
100

>>> a[1:3]
['huevos', 100]

>>> a[:2]
['spam', 'huevos']

>>> a[:2] + ['panceta', 2*2]
['spam', 'huevos', 'panceta', 4]
```

Python

Listas por referencia

```
>>> a = ['spam', 'huevos', 100, 1234]
>>> b = a
>>> b[2] = "perejil"
>>> a
```

Python

Listas por referencia

```
>>> a = ['spam', 'huevos', 100, 1234]
>>> b = a
>>> b[2] = "perejil"
>>> a
['spam', 'huevos', 'perejil', 1234]
```

Python

Listas por referencia

```
>>> a = ['spam', 'huevos', 100, 1234]
>>> b = a
>>> b[2] = "perejil"
>>> a
['spam', 'huevos', 'perejil', 1234]
```

Otros ejemplos

```
>>> 2*a[1:3] + ['tomate', 'lechuga']
```

Python

Listas por referencia

```
>>> a = ['spam', 'huevos', 100, 1234]
>>> b = a
>>> b[2] = "perejil"
>>> a
['spam', 'huevos', 'perejil', 1234]
```

Otros ejemplos

```
>>> 2*a[1:3] + ['tomate', 'lechuga']
['huevos', 'perejil', 'huevos', 'perejil', 'tomate', 'lechuga']
```

Python

Listas por referencia

```
>>> a = ['spam', 'huevos', 100, 1234]
>>> b = a
>>> b[2] = "perejil"
>>> a
['spam', 'huevos', 'perejil', 1234]
```

Otros ejemplos

```
>>> 2*a[1:3] + ['tomate', 'lechuga']
['huevos', 'perejil', 'huevos', 'perejil', 'tomate', 'lechuga']

>>> a = [2, "pirulo", [2, "montoto"]]
>>> a
```

Python

Listas por referencia

```
>>> a = ['spam', 'huevos', 100, 1234]
>>> b = a
>>> b[2] = "perejil"
>>> a
['spam', 'huevos', 'perejil', 1234]
```

Otros ejemplos

```
>>> 2*a[1:3] + ['tomate', 'lechuga']
['huevos', 'perejil', 'huevos', 'perejil', 'tomate', 'lechuga']

>>> a = [2, "pirulo", [2, "montoto"]]
>>> a
[2, 'pirulo', [2, 'montoto']]
```

Conversor de Fahrenheit a Celsius

f2c_v0.py

```
# conversor fahrenheit a celsius

print "C = (5/9)(F-32)"
```

Conversor de Fahrenheit a Celsius

Comentarios

```
# conversor fahrenheit a celsius

print "C = (5/9)(F-32)"
```

Conversor de Fahrenheit a Celsius

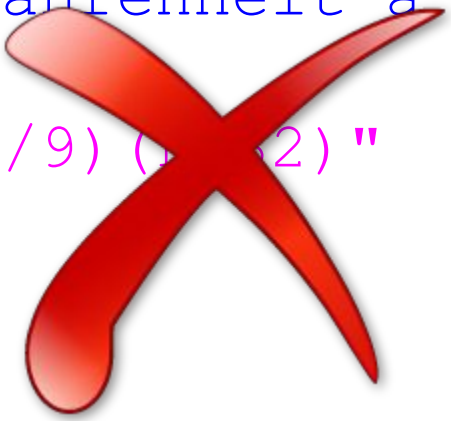
¿Hace lo que esperamos?

```
# conversor fahrenheit a celsius

print "C = (5/9)(F-32)"
```

Conversor de Fahrenheit a Celsius

Imprime la fórmula, pero no realiza ninguna conversión.

```
# conversor fahrenheit a celsius

print "C = (5/9)(F - 32)"
```



Conversor de Fahrenheit a Celsius

f2c_v1.py

```
# conversor fahrenheit a celsius

fahr = 80
cel = (5/9)*(fahr-32)
print "fahr=", fahr, " -> cel=", cel
```

Conversor de Fahrenheit a Celsius

Variables

```
# conversor fahrenheit a celsius

fahr = 80
cel = (5/9)*(fahr-32)
print "fahr=", fahr, " -> cel=", cel
```

Conversor de Fahrenheit a Celsius

Literales

```
# conversor fahrenheit a celsius

fahr = 80
cel = (5/9)*(fahr-32)
print "fahr=", fahr, " -> cel=", cel
```

Conversor de Fahrenheit a Celsius

Asignaciones

```
# conversor fahrenheit a celsius

fahr = 80
cel = (5/9)*(fahr-32)
print "fahr=", fahr, " -> cel=", cel
```

Conversor de Fahrenheit a Celsius

Impresión por pantalla de varios valores

```
# conversor fahrenheit a celsius

fahr = 80
cel = (5/9)*(fahr-32)
print "fahr=", fahr, " -> cel=", cel
```

Conversor de Fahrenheit a Celsius

¿Hace lo que esperamos?

```
# conversor fahrenheit a celsius

fahr = 80
cel = (5/9)*(fahr-32)
print "fahr=", fahr, " -> cel=", cel
```

Conversor de Fahrenheit a Celsius

Imprime "`far=80 -> cel=0`"

```
# conversor fahrenheit a celsius

fahr = 80
cel = (5/9)*(fahr-32
print "fahr=", fahr
```

```
> cel=", cel
```

Conversor de Fahrenheit a Celsius

División de enteros

```
# conversor fahrenheit a celsius

fahr = 80
cel = (5/9)*(fahr-32)
print "fahr=", fahr, " -> cel=", cel
```

Conversor de Fahrenheit a Celsius

f2c_v2.py

```
# conversor fahrenheit a celsius

fahr = 80
cel = (5*(fahr-32))/9
print "fahr=", fahr, " -> cel=", cel
```

Conversor de Fahrenheit a Celsius

Precedencia en el cálculo

```
# conversor fahrenheit a celsius

fahr = 80
cel = (5*(fahr-32))/9
print "fahr=", fahr, " -> cel=", cel
```

Conversor de Fahrenheit a Celsius

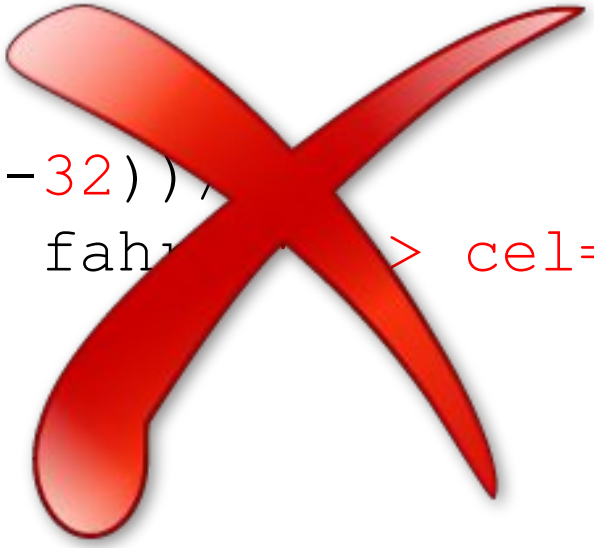
¿Hace lo que esperamos?

```
# conversor fahrenheit a celsius

fahr = 80
cel = (5*(fahr-32))/9
print "fahr=", fahr, " -> cel=", cel
```

Conversor de Fahrenheit a Celsius

Imprime "far=80 -> cel=26"

```
# conversor fahrenheit a celsius

fahr = 80
cel = (5*(fahr-32))/
print "fahr=", fahr
```



```
> cel=", cel
```

Conversor de Fahrenheit a Celsius

c2f_v3.py

```
# conversor fahrenheit a celsius

fahr = 80.0
cel = (5*(fahr-32))/9
print "fahr=", fahr, " -> cel=", cel
```

Conversor de Fahrenheit a Celsius

Variables de tipo float

```
# conversor fahrenheit a celsius

fahr = 80.0
cel = (5*(fahr-32))/9
print "fahr=", fahr, " -> cel=", cel
```

Conversor de Fahrenheit a Celsius

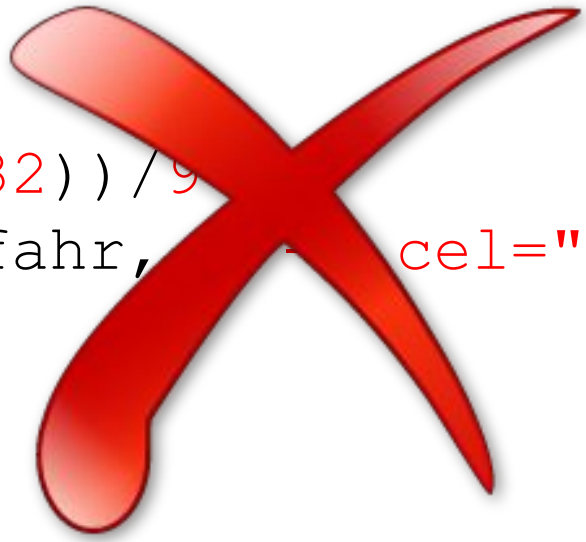
¿Hace lo que esperamos?

```
# conversor fahrenheit a celsius

fahr = 80.0
cel = (5*(fahr-32))/9
print "fahr=", fahr, " -> cel=", cel
```

Conversor de Fahrenheit a Celsius

Imprime fahr= 80.0 -> cel= 26.6666666667

```
# conversor fahrenheit a celsius

fahr = 80.0
cel = (5*(fahr-32))/9
print "fahr=", fahr, "  cel=", cel
```



Conversor de Fahrenheit a Celsius

c2f_v4.py

```
# conversor fahrenheit a celsius

fahr = 80.0
cel = (5*(fahr-32))/9
print "fahr=", round(fahr,2), " -> cel=", round(cel,2)
```

Conversor de Fahrenheit a Celsius

Redondeo con dos decimales

```
# conversor fahrenheit a celsius

fahr = 80.0
cel = (5*(fahr-32))/9
print "fahr=", round(fahr,2), " -> cel=", round(cel,2)
```

Conversor de Fahrenheit a Celsius

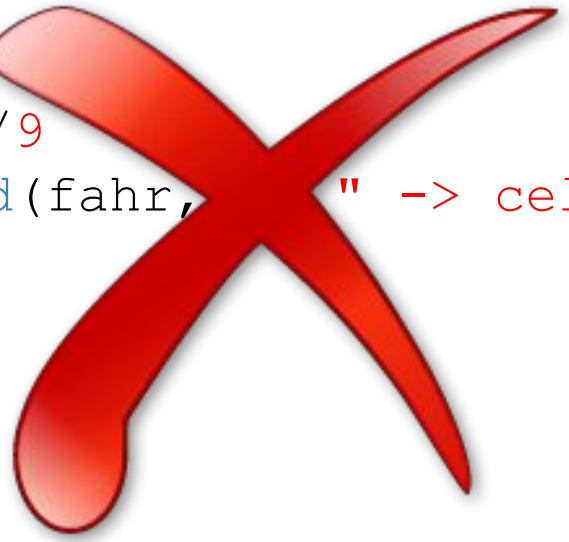
¿Hace lo que esperamos?

```
# conversor fahrenheit a celsius

fahr = 80.0
cel = (5*(fahr-32))/9
print "fahr=", round(fahr,2), " -> cel=", round(cel,2)
```

Conversor de Fahrenheit a Celsius

Sólo convierte para fahr = 80

```
# conversor fahrenheit a celsius

fahr = 80.0
cel = (5*(fahr-32))/9
print "fahr=", round(fahr,    " -> cel=", round(cel,2)
```



Conversor de Fahrenheit a Celsius

c2f_v5.py

```
# conversor fahrenheit a celsius
import sys

fahr = float(sys.argv[1])
cel = (5*(fahr-32))/9
print "fahr=", round(fahr,2), " -> cel=", round(cel,2)
```

Conversor de Fahrenheit a Celsius

Lectura de argumentos

```
# conversor fahrenheit a celsius
import sys

fahr = float(sys.argv[1])
cel = (5*(fahr-32))/9
print "fahr=", round(fahr,2), " -> cel=", round(cel,2)
```

Conversor de Fahrenheit a Celsius

¿Hace lo que esperamos?

```
# conversor fahrenheit a celsius
import sys

fahr = float(sys.argv[1])
cel = (5*(fahr-32))/9
print "fahr=", round(fahr,2), " -> cel=", round(cel,2)
```

Conversor de Fahrenheit a Celsius

Versión OK!

```
# conversor fahrenheit a celsius
import sys

fahr = float(sys.argv[1])
cel = (5*(fahr-32))/9
print "fahr=", round(fahr,2), " -> cel=", round(cel,2)
```

Ejercicio

Escribir un programa en Python que convierta millas a kilómetros.

Guardar el programa en un archivo que se llame m2k.py.