Python Programming

John Dunnion

School of Computer Science
University College Dublin

Outline

Variables and assignment

- A value can be assigned to a variable using the = operation
- After an assignment in the interpreter, no result is displayed before the next prompt

```
>>> length = 20
>>> breadth = 12
>>> area = length * breadth
>>> area
240
```

Variables must be defined

- If a variable is ‘not defined” (not assigned a value), trying to use it will generate an error

```
>>> x
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
NameError: name 'x' is not defined
```

Using numbers in Python programs (1)

```
# Calculating area of a rectangle #
p10.py

length = 2.7
breadth = 5.5

print('Length is: ', length)
print('Breadth is: ', breadth)

area = length * breadth
print('Area of rectangle is: ', length * breadth)
print('Area of rectangle is: ', area)
```

Using numbers in Python programs (2)

```
Length is:  2.7
Breadth is:  5.5
Area of rectangle is:  14.850000000000001
Area of rectangle is:  14.850000000000001
```

Using numbers in Python programs (3)

```
#  Calculating area of a rectangle
# Note use of # "+" in print statements
p11.py

length = 2.7
breadth = 5.5

print('Length is: ' + length )
print('Breadth is: ' + breadth)

area = length * breadth
print('Area of rectangle is: ', length * breadth)
print('Area of rectangle is: ', area)
```

Using numbers in Python programs (5)

```
# Calculating tax due on item #
p12.py
tax_rate = 13.5          # 13.5% VAT rate
nett_price = 199.99      # Net price in Euro
print('Nett Price is: ', nett_price)
print('Tax rate is: ', tax_rate)

tax_due = nett_price * tax_rate / 100
print('Tax due: ', tax_due)

total_price = nett_price + tax_due
print('Total price: ', total_price)

 print('Total price is: ',
              nett_price + nett_price * tax_rate / 100)
```

Using numbers in Python programs (6)

```
>>>
Nett Price is:  199.99
Tax rate is:  13.5
Tax due:  26.99865
Total price:  226.98865
Total price is:  226.98865
>>>
```

Using numbers in Python programs (7)

```
# Calculating area of a square and a circle
# Length of side of square = Diameter of circle
# p13.py

length = 2.7          # Length of side of square
radius = length / 2   # Radius of circle

pi = 3.1415927        # Defining pi

print('Length of side is: ', length)
print('Area of square is: ', length ** 2)

print('Radius of circle is: ', radius)
print('Area of circle is: ', pi * radius ** 2)
```

Using numbers in Python programs (8)

```
>>>
Length of side is:  2.7
Area of square is:  7.290000000000001
Radius of circle is:  1.35
Area of circle is:  5.72555269575
>>>
```

Importing the `math` module (1)

```
# Calculating area of a square and a circle #
# Length of side of square = Diameter of circle
# Using math.pi
  p14.py

import math

length = 2.7          # Length of side of square
radius = length / 2   # Radius of circle
print('Length of side is: ', length)
print('Area of square is: ', length ** 2)

print('Radius of circle is: ', radius)
print('Area of circle is: ', math.pi * radius ** 2)
print('Value of math.pi: ', math.pi)
```

Importing the `math` module (2)

```
>>>
Length of side is:  2.7
Area of square is:  7.290000000000001
Radius of circle is:  1.35
Area of circle is:  5.7255526111167399
Value of math.pi:  3.141592653589793
>>>
```

Importing the `math` module

- The `math` module provides some constants and a number of maths functions
- Functions include square root, factorial, trigonometric functions, . . .
- Constants include π (`math.pi`) and e (`math.e`)
- As you write bigger programs, you will find yourself importing several modules

Importing modules

- Documentation on the modules available is available at:
  - `https://docs.python.org/3/library`
    (currently **Python 3.9.7** documentation [30 August 2021])

- For example, documentation on the `math` module is available at:
  - Python 3.x:
    `https://docs.python.org/3/library/math.html`