

Objectives:

- Understand the data types: integer (int), real numbers (float), and character strings (str)
- Understand the assignment statement
- Understand arithmetic expressions including operator precedence and associative
- Understand mixed-mode arithmetic and type conversions

Part A: Print and escape sequences

Start IDLE in interactive mode. Predict the output of the following print statement:

```
>>> print "line 1\nline 2:\t\t<house\b\b\brse>\nline3" + chr(7)
```

Hint: Table 2.3 (p. 50) contains useful escape sequences.

Prediction:

Actual:

For each of the following write a single `print` statement to generate the following output.

- That's all folks
- "Now" means "NOW!"
- Line 1: cat
Line2: dog
Line3: mouse

Part B: Arithmetic Expressions

Given that the operator precedence for Python's mathematical operations is (from highest to lowest):

- Operations that are enclosed in parentheses.
- Exponentiation `**` (right associative)
- Unary negation `-` and positive `+`
- Multiplication `*`, division `/`, and remainder `%` (left associative)
- Addition `+` and subtraction `-` (left associative)
- Assignment operator `=`

For each of the following arithmetic expressions, predict the results and then check your prediction using IDLE in interactive mode.

Arithmetic Expression	Predicted Results	Actual Results via IDLE
$3 + 4 + 5 / 3$		
$(5 + 6) / 2$		
$4 + 3 * 6 - 2 / 4$		
$4 + 2 ** 3 - 5$		
$+ 5 / 6 - 9 \% 4$		
$(4 + 2) ** (3 - 5)$		
$2 ** 2 ** 3$		

An operation involving two int operands yields an int result. An operation involving two float operands yields a float result. *Mixed-type expressions* involving an int operand and a float operand causes the int to be converted to a float before the operation with the result being a float. For each of the following arithmetic expressions, predict the results and then check your prediction using IDLE in interactive mode.

Arithmetic Expression	Predicted Results	Actual Results via IDLE
2 + 5 / 2.0		
2.0 ** 0 + 7 / 2		
9.0 / 4 + 5		
5 % 2.6 + 9 / 4		

You can explicitly convert a value to a specific type (called *casting*) by using the functions `int()` or `float()`. For each of the following arithmetic expressions, predict the results and then check your prediction using IDLE in interactive mode.

Arithmetic Expression	Predicted Results	Actual Results via IDLE
<code>int(float(8) / 3) * float(2)</code>		
<code>round(5 / 3.0) + 7 / 3.0</code>		
<code>8.0 + abs(-7) / (1 + 2)</code>		

After you have completed Parts A and B, raise your hand and show an instructor. If you have a question about why your prediction(s) did not match the actual result(s), NOW would be a good time to ask.

Part C: Write a simple program

In the Python Shell window, open a new window to create a program using the File | New Window menu option. In this new window complete the Python program that takes the radius of sphere (a floating point number) as input and outputs the sphere's diameter, circumference, surface, and volume. The formulas for these are:

$$\text{circumference} = 2\pi \times \text{radius}$$

$$\text{surface} = 4\pi \times \text{radius}^2$$

$$\text{volume} = \frac{4}{3}\pi \times \text{radius}^3$$

```

"""
File: sphere.py
Author: <your name here>
Description: Program to calculate the sphere's diameter,
circumference, surface, and volume.
"""
import math

radius = input("Enter the sphere's radius: ")
circumference = 2.0 * math.pi * radius
print "The sphere's circumference is", circumference

```

When you are ready to run this program, use the Run | Run Module menu option. IDLE will ask you to save the file first -- use the file name `sphere.py`. NOTE: You'll need to explicitly add the ".py" extension.

After you have your program working correctly ("debugged your program"), raise your hand and demonstrate your program.

If you complete all parts of the lab, nothing needs to be turned in for this lab. If you do not get done today, then show me the completed lab in next week's lab period.

Make sure that you log off the computer before you leave.