

1) 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)

Evaluate each of the following:

a)  $6 + 3 * 5$

b)  $(6 + 2) / 2$

c)  $-4 + 2 ** 3 ** 2 - 5$

d)  $7 \% 4 + 5 * 6$

e)  $4---9$

2) 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, so the result is a float. Evaluate each of the following:

a)  $2 + 5 / 2$

b)  $2.0 + 5 / 2$

c)  $2 + 5 / 2.0$

d)  $8.0 \% 3 / 4$

3) You can explicitly convert a value to a specific type (called *casting*) by using the functions `int()` or `float()`.

Evaluate each of the following:

a) `float(2) + 5 / 2`

b) `2.0 + 5 / float(2)`

c) `float(2 + 5) / 2`

d) `int(9.9) / float(2)`

4) Python has a few `__builtins__` functions related to character manipulation: `chr(65)` returns 'A', `ord('A')` returns 65, `unichr(65)` returns u'A'. What would be the result of each of the following?

a) `chr(ord('B') + 32)`

b) `chr(ord('A') + 5)`

5) Python has a few `__builtins__` functions related to numeric calculations: 'abs', 'max', 'min', 'round', 'sum', but more can be accessed by importing the `math` module:

```
>>> import math
>>> dir(math)
['__doc__', '__name__', 'acos', 'asin', 'atan', 'atan2', 'ceil', 'cos', 'cosh',
'degrees', 'e', 'exp', 'fabs', 'floor', 'fmod', 'frexp', 'hypot', 'ldexp', 'log',
'log10', 'modf', 'pi', 'pow', 'radians', 'sin', 'sinh', 'sqrt', 'tan', 'tanh']
>>> math.sqrt(20)
4.4721359549995796
```

Write a 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:

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

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

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

6) A Python script in its own file can be thought of as the “main” module. Consider the file `bell.py`.

```
"""
File:  bell.py
Author:  Mark Fienup
Description:  Demonstrates non-printable character
"""
print "line 1\nline 2:\t\t<house\b\b\brse>\nline3" + chr(7)
raw_input("Hit any key")
```

We can run the “main” module in the Python shell by:

```
>>> import bell
```

a) What do you predict will happen when the `bell.py` script is run?

b) What actually happened?