Python review sheet: Exam 1

Variable:
A location where you can store a value.

Variable names:
Must start with a letter
Can contain only letters, digits, underscores
Case-sensitive

Assignment:
Stores a value in a variable
Examples:
    sum = 0
    count = count + 1

Data types:
Values have types. Some types are int, float, str.
Variables can change their types as the program runs, as new values are stored in them.
Type names can be used for type conversions:
    x = int(3.4)

Input:
raw_input prints a prompt and returns a string. Use type conversion if needed.
Example:
    num = float(raw_input("Enter a number: "))

Output:
print prints one or more values on the screen.
Example:
    print count
    print "The sum of", x, "and", y, "is", sum

Decisions:
    if condition:
        statements
    elif condition:
        statements
    elif condition:
        statements
    ...
    else:
        statements

The elif and else parts are optional.

Example:
    if x > 0:
        print "x is positive"
    elif x == 0:
        print "x is zero"
    else:
        print "x is negative"
Operators:

<table>
<thead>
<tr>
<th>Operator</th>
<th>Meaning</th>
<th>Example</th>
<th>Resulting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>x + y</td>
<td>Addition, if x &amp; y are numbers</td>
<td>3 + 4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Concatenation, if x &amp; y are strings</td>
<td>&quot;abc&quot; + &quot;def&quot;</td>
<td>&quot;abcdef&quot;</td>
</tr>
<tr>
<td>x - y</td>
<td>Subtraction</td>
<td>9 - 4</td>
<td>5</td>
</tr>
<tr>
<td>x * y</td>
<td>Multiplication, if x &amp; y are numbers</td>
<td>25 * 4</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Multiple copies, if number &amp; string</td>
<td>3 * &quot;ab&quot;</td>
<td>&quot;ababab&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&quot;ab&quot; * 3</td>
<td>&quot;ababab&quot;</td>
</tr>
<tr>
<td>x / y</td>
<td>Real division if x or y are floats.</td>
<td>3.0 / 2.0</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Integer division if x &amp; y are ints.</td>
<td>3 / 2</td>
<td>1</td>
</tr>
<tr>
<td>x // y</td>
<td>Integer division always.</td>
<td>3 // 2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.0 // 2.0</td>
<td>1.0</td>
</tr>
<tr>
<td>x % y</td>
<td>Remainder after division</td>
<td>17 % 5</td>
<td>2</td>
</tr>
<tr>
<td>x ** y</td>
<td>Exponentiation</td>
<td>5 ** 2</td>
<td>25</td>
</tr>
<tr>
<td>x &lt; y</td>
<td>Less than</td>
<td>3 &lt; 4</td>
<td>True</td>
</tr>
<tr>
<td>x &gt; y</td>
<td>Greater than</td>
<td>10 &gt; 2</td>
<td>True</td>
</tr>
<tr>
<td>x &lt;= y</td>
<td>Less than or equal</td>
<td>5 &lt;= 8</td>
<td>True</td>
</tr>
<tr>
<td>x &gt;= y</td>
<td>Greater than or equal</td>
<td>9 &gt;= 2</td>
<td>True</td>
</tr>
<tr>
<td>x == y</td>
<td>Equal</td>
<td>3 == 3</td>
<td>True</td>
</tr>
<tr>
<td>x != y</td>
<td>Not equal</td>
<td>8 != 7</td>
<td>True</td>
</tr>
<tr>
<td>x and y</td>
<td>True if x and y both true</td>
<td>3 &lt; 4 and 4 &lt; 5</td>
<td>True</td>
</tr>
<tr>
<td>x or y</td>
<td>True if x or y or both are true</td>
<td>3 &lt; 4 or 4 &lt; 0</td>
<td>True</td>
</tr>
<tr>
<td>not x</td>
<td>True iff x is false</td>
<td>not 100 &lt; 12</td>
<td>True</td>
</tr>
<tr>
<td>x in (a, b, c)</td>
<td>x == a or x == b or x == c</td>
<td>4 in (2, 4, 6)</td>
<td>True</td>
</tr>
<tr>
<td>x not in (a, b)</td>
<td>x ≠ a and x ≠ b</td>
<td>4 not in (9, 8, 13)</td>
<td>True</td>
</tr>
</tbody>
</table>

Void function example:

```python
def print_results(sa, v):
    # Print surface area and volume of a solid, with formatting
    print "The surface area is", round(sa, 2), "square inches"
    print "The volume is", round(v, 2), "cubic inches"

# Surface area and volume of a cube
height = float(raw_input("Height of cube: "))
surface_area = 6 * height ** 2
volume = height ** 3
print_results(surface_area, volume)
```

Fruitful function example:

```python
import math
def volume(radius, height):
    # Compute the volume of a cylinder
    area_of_base = math.pi * radius ** 2
    return area_of_base * height

r = float(raw_input("Radius: "))
h = float(raw_input("Height: "))
print volume(r, h)
```