Python Style: Readability

Context

When we study a foreign language we learn:

- the rules to spell words and construct correct sentences - this is syntax.
- the meanings of words and how to interpret sentences - this is semantics.
- how language reflects an author's personality and audience - this is style.

In CS courses, we study the syntax, semantics, and style of programming languages. This activity assumes you are familiar with syntax and semantics and focuses on style.

In this activity, we'll be looking at what makes code readable, specifically when using variables and expressions.

Exercises

1.

```python
X
i1 = 10
i2 = 5
c1 = 9.99
c2 = 4.99
d1 = 0.06
d2 = 0.99
s1 = i1*c1+i2*c2
t1 = s1+s1*d1+i1*d2

Y
num_cd = 10
num_mp3 = 5
cost_cd = 9.99
cost_mp3 = 4.99
ship_cd = 0.99
rate_tax = 0.06
sub_cost = (num_cd * cost_cd) + (num_mp3 * cost_mp3)
sub_ship = num_cd * ship_cd
sub_tax = sub_cost * rate_tax
total = sub_cost + sub_tax + sub_ship
```
Which code block on page 1 (X or Y):

a. Is shorter and would take less time to type? 

b. Uses more variables?

c. Would be easier to edit or debug?

2. 

X

```python
def foo(s):
    if len(s) <= 2:
        return s
    first = s[0]
    last = s[len(s) - 1]
    mid = s[1:len(s) - 1]
    halfway = len(mid) // 2
    return first + mid[halfway:] + mid[:halfway] + last
```

Y

```python
def foo(s):
    if len(s) <= 2:
        return s
    return (s[0] + s[1:len(s) - 1][(len(s) - 2) // 2:] +
            s[1:len(s) - 1][:(len(s) - 2) // 2] + s[len(s) - 1])
```

Which code block for foo(s) (X or Y):

a. Is shorter and would take less time to type?

b. Uses more variables?

c. Would be easier to edit or debug?

3. For each item below, choose the better option: X, Y, or ? (can’t decide).

<table>
<thead>
<tr>
<th>Option X</th>
<th>Option Y</th>
<th>X/Y/?</th>
</tr>
</thead>
<tbody>
<tr>
<td>i1 = 3</td>
<td>num_closed = 3</td>
<td></td>
</tr>
<tr>
<td>i2 = 7</td>
<td>num_open = 7</td>
<td></td>
</tr>
<tr>
<td>num_cat = 2</td>
<td>num_cat = 2</td>
<td></td>
</tr>
<tr>
<td>num_dog = 5</td>
<td>dog_num = 5</td>
<td></td>
</tr>
<tr>
<td>numson = 3</td>
<td>num_son = 3</td>
<td></td>
</tr>
<tr>
<td>isdone = True</td>
<td>is_done = True</td>
<td></td>
</tr>
</tbody>
</table>
4. Based on your answers to questions 1-3, summarize style advice for working with variables.

5. For each item below, choose the better option: X, Y, or ? (can’t decide).

<table>
<thead>
<tr>
<th>Option X</th>
<th>Option Y</th>
<th>X/Y/?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ( s1 = (i_1 \ast c_1) + (i_2 \ast c_2) )</td>
<td>( s1 = i_1 \ast c_1 + i_2 \ast c_2 )</td>
<td></td>
</tr>
<tr>
<td>b. ( s1 = c_1 \ast i_1 + i_2 \ast c_2 )</td>
<td>( s1 = i_1 \ast c_1 + i_2 \ast c_2 )</td>
<td></td>
</tr>
</tbody>
</table>
| c. \( \text{total} = n_{cd} \ast s_{cd} + (n_{cd} \ast c_{cd} + n_{mp3} \ast c_{mp3}) \ast (1 + \text{rate}_{\text{tax}}) \) | \( \text{cost} = (n_{cd} \ast c_{cd}) + (n_{mp3} \ast c_{mp3}) \)  
\( \text{ship} = n_{cd} \ast s_{cd} \) 
\( \text{tax} = \text{cost} \ast \text{rate}_{\text{tax}} \) 
\( \text{total} = \text{cost} + \text{tax} + \text{ship} \) |        |

6. Based on your answers to question 5, summarize advice for writing expressions.