CSE 160 Section 4
Midterm Practice Solutions

1. Evaluate the following Python expressions:

\[
\begin{align*}
(5 / 2) + 2 \times 2 &= 6 \\
2 + 2 \times 2 &= 6 \\
2 + 4 &= 6 \\
6 &= 6 \\
\text{"live", "long", "and", "prosper"}[1][1:] &= \text{"long"}[1:] \\
\text{"long"}[1:] &= \text{"ong"} \\
\text{len}({\text{"one"}, 2: \text{"two"}, 3: \text{"three"}}[2]) &= \text{len}(\text{"two"}) \\
\text{len}(\text{"two"}) &= 3 \\
\text{float}(\text{str}(2 + 2) + \text{"5"}) + 1 &= 7 \\
\text{float}(\text{str}(4) + \text{"5"}) + 1 &= 9 \\
\text{float}(\text{"4"} + \text{"5"}) + 1 &= 10 \\
\text{float}(\text{"45"}) + 1 &= 46.0 \\
45.0 + 1 &= 46.0 \\
\text{itemgetter}(1)([\text{"to", "boldly", "go"}]) &= \text{"boldly"} \\
\text{f}([\text{"to", "boldly", "go"}]) &= \text{"boldly"}
\end{align*}
\]

2. Write a function that sorts a list of numbers by their absolute value, and returns a new sorted list as the result. One possible solution:

```python
def sort_abs(items):
    return sorted(items, key=abs)
```

3. Write a function that takes a list as a parameter, and returns a set containing the elements that appear more than once in the list. One possible solution:

```python
def duplicates(input_list):
    seen = set()
    result = set()
    for element in input_list:
        if element in seen:
            result.add(element)
        seen.add(element)
    return result
```
4. Write a function that takes a string as an argument, and returns a dictionary that maps each character to its frequency in the given string. One possible solution:

```python
def freq(input_string):
    result = {}
    for character in input_string:
        if character not in result:
            result[character] = 0
        result[character] = result[character] + 1
    return result
```

5. Write a function that reverses a list, without using the built-in reverse function. Your function should return the reversed list, and not modify the list passed as a parameter. One possible solution:

```python
def reverse_list(original_list):
    result = []
    for i in range(len(original_list) - 1, -1, -1):
        result.append(original_list[i])
    return result
```

Another possible solution:

```python
def reverse_list(original_list):
    result = []
    for element in original_list:
        result.insert(0, element)
    return result
```

6. For each of the locations indicated above, draw the environment frame(s) at that moment during execution.

Location A:

<table>
<thead>
<tr>
<th>Global Environment</th>
<th>percent_error</th>
</tr>
</thead>
<tbody>
<tr>
<td>a -&gt; 15.0</td>
<td>actual -&gt; 15.0</td>
</tr>
<tr>
<td>b -&gt; 10.0</td>
<td>expected -&gt; 10.0</td>
</tr>
<tr>
<td>pos_dif -&gt; (function)</td>
<td></td>
</tr>
<tr>
<td>percent_error -&gt; (function)</td>
<td></td>
</tr>
</tbody>
</table>

Location B:

<table>
<thead>
<tr>
<th>Global Environment</th>
<th>percent_error</th>
<th>pos_dif</th>
</tr>
</thead>
<tbody>
<tr>
<td>a -&gt; 15.0</td>
<td>actual -&gt; 15.0</td>
<td>y -&gt; 15.0</td>
</tr>
<tr>
<td>b -&gt; 10.0</td>
<td>expected -&gt; 10.0</td>
<td>x -&gt; 10.0</td>
</tr>
<tr>
<td>pos_dif -&gt; (function)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>percent_error -&gt; (function)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Location C:

Global Environment  percent_error
a -> 15.0      actual -> 15.0
b -> 10.0      expected -> 10.0
pos_dif -> (function)  x -> 5.0
percent_error -> (function)  y -> 10.0

For more information, execute the code using the Python Tutor.