Problem: Summing the Elements of a List

```python
def sum(the_list):
    """Returns: the sum of all elements in the_list
    Precondition: the_list is a list of all numbers
    (either floats or ints)"
    result = 0
    for x in the_list:
        result = result + x
    return result
```

What gets printed? (Q1)

<table>
<thead>
<tr>
<th>a = 0</th>
<th>a = 0</th>
<th>a = 0</th>
<th>a = 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>for b in [1]:</td>
<td>for b in [1, 2]:</td>
<td>for b in [1, 2, 3]:</td>
<td>for b in [1, 2, 3]:</td>
</tr>
<tr>
<td>a = a + 1</td>
<td>a = a + 1</td>
<td>a = a + 1</td>
<td>a = b</td>
</tr>
<tr>
<td>print(a)</td>
<td>print(a)</td>
<td>print(a)</td>
<td>print(a)</td>
</tr>
</tbody>
</table>

What gets printed? (Q2)

<table>
<thead>
<tr>
<th>a = 0</th>
<th>a = 0</th>
<th>a = 0</th>
<th>a = 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>for b in [1, 2, 3]:</td>
<td>for b in [1, 2, 3]:</td>
<td>for c in b:</td>
<td>for c in b:</td>
</tr>
<tr>
<td>a = a + b</td>
<td>b = [1, 2, 3]</td>
<td>a = a + c</td>
<td>a = a + c</td>
</tr>
<tr>
<td>print(a)</td>
<td>print(a)</td>
<td>print(b)</td>
<td>print(b)</td>
</tr>
</tbody>
</table>
**range**: a handy counting function!

- `range(x)` returns 0, 1, …, x - 1
- `range(a, b)` returns a, …, b - 1

Important: **range does not return a list**
→ need to convert ranges’ return value into a list

```python
>>> first_six = list(range(6))
[0, 1, 2, 3, 4, 5]

>>> print(first_six)
[0, 1, 2, 3, 4, 5]
```

```python
>>> second_six = list(range(6, 13))
[6, 7, 8, 9, 10, 11, 12]

>>> print(second_six)
[6, 7, 8, 9, 10, 11, 12]
```

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## The Map Function

- `map(function, (list))`
- *(function)* takes 1 parameter
- Otherwise, error

Important: **map does not return a list**
→ need to convert map’s return value into a list

```python
>>> len_list = list(map(len, ['a', 'bc', 'defg']))
>>> len_list
[1, 2, 4]
```

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## The Filter Function

- `filter(Boolean_function, (list))`
- *(function)* takes 1 parameter
- *(function)* returns a Boolean
- Collects elements of *(list)* for which *(Boolean_function)* returns True

Important: **filter does not return a list**
→ need to convert map’s return value into a list

See ints.py to see filter in action

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**For-Loop Mistake #1 (Q)**

Modifying the loop sequence as you walk through it.

```python
b = [1, 2, 3]
for a in b:
    b.append(a)

print b
```

A: never prints b
B: [1, 2, 3, 1, 2, 3]
C: [1, 2, 3]
D: I do not know

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**For-Loop Mistake #2 (Q)**

Modifying the loop variable (here: x).

```python
def add_one(the_list):
    """Adds 1 to every element in the list
    Precondition: the_list is a list of all numbers
    (either floats or ints)""
    for x in the_list:
        x = x + 1

a = [5, 4, 7]
add_one(a)
print(a)
```

A: [5, 4, 7]
B: [5, 4, 7, 5, 4, 7]
C: [6, 5, 8]
D: Error
E: I don’t know

---

What gets printed? (Q3)

```python
a = 0
for b in range(0, 1):
    a = a + 1
print(a)
```

```python
a = 0
for b in range(0, 4):
    a = a + 1
print(a)
```

A: 0
B: 0
C: 0
D: 0
E: 0