CS 110 – Creative Problem Solving in Computer Science

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Homework 5

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This homework is about for-loops in Python.

Useful list functions.

`https://docs.python.org/2/tutorial/datastructures.html`

`list.insert(i, x)`

Insert an item at a given position. The first argument is the index of the element before which to insert, so a.insert(0, x) inserts at the front of the list, and `a.insert(len(a), x)` is equivalent to `a.append(x)`.

`list.pop([i])` Remove the item at the given position in the list, and return it. If no index is specified, `a.pop()` removes and returns the last item in the list. (The square brackets around the i in the method signature denote that the parameter is optional, not that you should type square brackets at that position. You will see this notation frequently in the Python Library Reference.)

Exercises

1. Read Chapters 1 and 2 of Computing for Biologists by Libeskind-Hadas and Bush.

2. (40 points) Consider the Python function `replace`(x, y, lst) that returns the result of replacing every x by y in lst.

   Test cases:

   ```
   >>> replace(1,2,[1,2,3,1])
   [2, 2, 3, 2]
   >>> replace(1,2,[])
   []
   >>> replace (4,5,[1,2,2])
   ```

```
[1, 2, 2]
>>>
```

(a) Implement `replace` using for-loops.

(b) Implement `replace` using map.

3. (40 points) Write a function `x_count`(x, lst) that returns the number of x's in lst.

   Test cases:

```
>>> x_count("a", ["a", 3, 4, 66, "b","a"])
2
>>> x_count("b", ["a", 3, 4, 66, "b","a"])
1
>>> x_count(27, ["a", 3, 4, 66, "b","a"])
0
>>> x_count("a", [])
0
>>>
```

   (a) Implement `x_count` using for-loops.

   (b) Implement `x_count` using map and reduce.

4. (20 points) Write a hand trace of `mystery(3)`.

```
def mystery(n):
    for d in range(2, n):
       if n % d == 0:
          return False
    return True
```