Math 2300: Discrete Mathematics
Introduction to Python 3 - Lists and Loops Textbook Section

Terms, Concepts, and Examples

- A **list** is a collection of values which is ordered and changeable. Values are allowed to be duplicated. Lists can be created by just placing a sequence of data inside square brackets.

  Examples of lists:

```
even = [2, 4, 6, 8, 10]
fruit = ["apple", "banana", "cherry"]
r = [-2, -1, -2, 3, 5, -1]
```

- You access items in a list by referring to the **index number**. However, be aware that Python begins with 0 rather than 1. You can also use a negative index to access items starting from the end of the list.

  Examples: Determine what would print for each element.

```
myList = ["the", "quick", "brown", "fox", "jumps", "over"]
print(myList[0])
print(myList[3])
print(myList[-1])
```

  Solution: myList[0] is the first element in the list "the" myList[3] is the fourth element in the list "fox" myList[-1] is the last element in the list "over"

  Video Example of Lists

- Python has a built in function to determine the **length of a list**, len( ).

- **Loops** are a way to repeat a set of actions a specific number of times under certain conditions. When you want to perform a certain action for every item in the list, use a **for loop**.

  The general syntax for a for loop is

```
for item in list:
        indentedActionBlock
```

- To loop through a set of code a specified number of times, we can use the **range( )** function. The range( ) function returns a sequence of numbers, starting from 0, and increments by 1, and ends at a specified number.

  Example: Try putting this code in Python tutor and see what prints.

```
for i in range(5):
        print(i)
```

Solution: It will print 0, then on the next line 1, until on the last line it prints 5. It is important to note that the range function ran 6 times, printing the numbers 0 through 5.

Video Example of Loops with Lists

Video Example of Loops with Indices

Practice Problems

1.
```
numbers = [1, 2, 4, 6, 11, 20]
sq = 0
for val in numbers:
    sq = val * val
    print(sq)
```

   First, determine what you think this code will print out. Then, try putting it in Pythontutor to check.

2.
```
for i in range(1,10,2):
    print(i)
```

   First, determine what you think this code will print out. Then try putting it in Pythontutor to check.

3. Write Python code to satisfy the following conditions. Then test your code on the values of the variables given.

   Return the number of even ints in the given list. Recall: the % "mod" operator computes the remainder, e.g. 5 % 2 is 1.

   If the list is [2, 1, 2, 3, 4]) it should return 3. If the list is [2, 2, 0] it should return 3. If the list is [1, 3, 5]) it should return 0.

```
def countEvens(nums):
```