A sequence contains multiple items of data.

Mutable sequences: lists  
Immutable sequences: tuples, strings  
Arrays are similar to lists but much more limited in functionality. Not used in python.

Python has a built-in list() function that can convert certain types of objects to list.  
ex.) numbers = list(range(5))

Repitition operators take strings or lists and join them:  
list \* n  
ex.) numbers = [0] \* 5  
print(numbers)  
[0, 0, 0, 0, 0]

Indexing:  
The index of the first element is 0 and the index of the last element is -1  
If you don’t use a valid index, an IndexError exception will occur

If you search with the index method and the item isn’t there, a ValueError exception will occur.

You can concatenate lists only with other lists. You can use the + or augmented assignment operators to concatenate.

A slice is a subsection of a sequence or span o fitems that are taken from a sequence.

If you leave out the end index in a slicing expression, Python uses the length of the list as the end index.  
If you leave out both the start and end index in a slicing expression, you get a copy of the entire list.

Finding Items in Lists with the in Operator:

You can search for an item in a list with an in operator and determine if that item is really in a list. Format is:  
item in list

Lists have numerous methods that allow you to work with the elements they contain. Python also provides some built-in functions that are useful for working with lists:

Append(item)  
Index(item)  
Insert(index, item)- when used, the list is expanded in size to accommodate the new item. The item that was previously at the specified index and all items after are shifted by one position. If no index is specified, adds at end of the list. If you use a negative index, inserts at beginning of the list  
Sort() – sorts in ascending order  
remove(item)  
reverse() – reverse sorts  
Del- removes a specific item in index regardless of whats in the index  
min- shows the smallest thing in a list  
max- shows the biggest item in a list

**Study 8-4 more. Know the difference between remove and del**

Insert format: name.insert(0, “Joe”)  
Sort format: my\_list.sort()  
remove format:food.remove(item)  
del my\_list[2]  
min(my\_list)  
max(my\_list)

Assigning one variable to another variable makes both variables reference the same list in memory.

Making a separate but identical list:

List1 = [1, 2, 3, 4]  
list2 = [] + list1

Some tasks may require you to save the contents of a list to a file so the data can be used at a nother time. You use writelines for this. Ex)

Cities = [‘New York’, ‘Boston’, ‘Dallas’]  
outfile = open(‘cities.txt.’, ‘w’)  
outfile.writelines(cities)  
outfile.close

My\_tuple = (1, 2, 3, 4, 5)

CH 5 REVIEW QUESTION:

An individual item in a list is an element

An index is a number that identifies an item in a list

The first index is 0, the last index is the size of a list minus 1

If you try to use an index out of range for a list, an Index Error exception will occur

Len returns the length of a list

When the \* operator’s left operand is a list and the right is an integer, the operator becomes a repetition operator

Append adds an item to the end of an existing list

Del removes an item at a specific index in a list

To insert Labrador to the list at index 0= mylist.insert(0, Labrador)

If you call the index method to locate an item in the list and its not found, a Value exception is raised

Max is a built in function that reutnrs the highest value in a list

This file object method returns a list containing the lists file contents: readlines

**Study readlines, writelines etc**

1. **Why do tuples exist?**
2. **Whats the difference between tuples and lists?**
3. **Convert my\_list to a tuple**
4. **Connvert my\_tuple to a list**

8.1 What will the following code display?

numbers = [1, 2, 3, 4, 5]

numbers[2] = 99

print(numbers)

8.2 What will the following code display?

numbers = list(range(3))

print(numbers)

8.3 What will the following code display?

numbers = [10] \* 5

print(numbers)

8.4 What will the following code display?

numbers = list(range(1, 10, 2))

for n in numbers:

print(n)

8.5 What will the following code display?

numbers = [1, 2, 3, 4, 5]

print(numbers[-2])

8.6 How do you find the number of elements in a list?

8.7 What will the following code display?

numbers1 = [1, 2, 3]

numbers2 = [10, 20, 30]

numbers3 = numbers1 + numbers2

print(numbers1)

print(numbers2)

print(numbers3)

8.8 What will the following code display?

numbers1 = [1, 2, 3]

numbers2 = [10, 20, 30]

numbers2 += numbers1

print(numbers1)

print(numbers2)

+++++++

INDEXERRORS

An IndexError exception will occur if you try to use an index that is out of range for a particular string.

Len function returns length. Ex.)  
size = len(city)

A common operation performed on strings is concatenation.

Because strings are immutable, you cannot use an expression in the form string[index]

Isalnum= returns true if the string contains alphabetic letters and digits

Isalpha= returns true only if the string is just alphabetic letters

Isdigit() = returns true if the string contains only numeric digits and is at least one character in length

Islower – returns true if the string contains only whitespace characters

Isupper- returns true if all the alphabetic letters are uppercase

Although strings are immutable and can’t be modified, they do have a number of methods that return modified versions of themselves:

Lower()- returns a copy of the string with all alphabetic letters converted to lowercase

Lstrip()- returns a copy of the string with all leading whitespace characters removed

Lstrip(char)- returns a copy of the string with all instances of char that appear at the beginning of the string removed

Rstrip()- returns a copy of the string with all trailing whitespace characters remoed

Rstrip(char)- returns a copy with all instances fo char that appear at the end of the string removed

Strip()- returns a copy of the string with all leading and trailing whitespace characters removed

Upper()- returns a copy of the string with all alphabetic letters converted to uppercase

Search and replace methods:

Endswith(substring) – method returns true if string ends with substring

Find(substring)- method returns the lowest index in the string where the substring is found

Replace(old, new)

Startswith(substring)- returns true if the string starts with a substring

In python a dictionary is an object that stores a collection of data. Each element stored in a dictionary has two parts, a key and a value. Dictionary elements are commonly referred to as key-value pairs.

Key value pairs are often referred to as mappings because each key is mapped to a value

You can create a dictionary by enclosing the elements inside curly braces. An element consists of a key, a colon, and a value, separated by commas.

A KeyError exception is raised if you try to retrieve a value with a nonexistent key

Dictionaries are mutable

Adding to a dictionary:

Dictionary\_name[key] = value  
phonebook[‘Chris’] = ‘555-4444’

Deleting from dictionary:

Del dictionary\_name[key]

Ex) del phonebook[‘Chris’]

You cannot have duplicate keys in a dictionary. When you

You assign a value to an existing key, the new value replaces the existing value.

You can use the built in len function to get number of elements from a dictionary:

Num\_items = len(phonebook)

Dictionary methods:

Clear – clears the contents of a dictionary

Get- gets the value associated with a specific key

Items- returns all of the keys in a dictionary

CH11

Procedural programming centers on the procedures or actions that take place ina program. Object oriented program is centered on objects, created from abstract data types that encapsulate data and functions together.

An object is a self contained unit that consists of data attributes and methods that operate on data attributes.

OOP addresses the problem of code and data separation through encapsulation and data hiding. Encapsulation refers to the combining of data and code into a single object. Data hiding refers to an objects ability to hide its data attributes from code outside the object.

OOP has been encouraged by the trend of object reusability.

A class definition is a set of statements that define a class’s methods and data attributes.

The init method is automatically executed when an instance of the clas is created in memory. The init method is known as an initializer method because it initializes the object’s data attributes.

Immediately after an object is created in memory, the init method executes and the self parameter is automatically assigned the object that was just created.

The statemet assigns the string to the attribute belonging to the data that was just created.

To create an object in memory from the coin class:

My\_coin = coin.Coin()

My\_coin.Coin()

Then the coin’s class init method is executed and the self parameter is automatically set to the object that was just created.

After these steps take place, a coin object will exist with its attributes assigned

Accessor and mutator methods

Common practice to make all of a class’s data attributes private and to provide public methods of accessing and changing those attributes to ensure the object owning those attributes is in control of changes being made to them

A method that returns value from a class’s attribute but does not change it is an accessory method. Doesn’t expose the attributes in a way where they could be changed outside the program.

A mutator method can control the way a class’s data attributes are modified.When a code outside the class needs to change the value of an object’s data attribute, it typically calls a mutator and passes the new value as an argument.

Mutatator is called setters, accessor called getters

UML – unified modeling language

Top section – name of class

Middle section- data attributes

Bottom section- class’s methods

Following steps to find classes in a problem:

Get a written description of the problem domain

Identifiy all nouns (pronouns, noun phrases) in the description

Refine the list to include only the classes relevant to the problem

The problem domain is a set of real world events etc. If you adequately understand the nature of the problem you are trying tos sole, write a description.