Dictionaries in Python

Basic Theory:

Each key is separated from its value by a colon (:), the items are separated by commas, and the whole thing is enclosed in curly braces. An empty dictionary without any items is written with just two curly braces, like this: {}.
Keys are unique within a dictionary while values may not be. The values of a dictionary can be of any type, but the keys must be of an immutable data type such as strings, numbers, or tuples.
Accessing Values in Dictionary

```
dict = {'Name': 'Zara', 'Age': 7, 'Class': 'First'}
print "dict['Name']: ", dict['Name']
print "dict['Age']: ", dict['Age']
```

Updating Dictionary

```
dict = {'Name': 'Zara', 'Age': 7, 'Class': 'First'}
dict['Age'] = 8; # update existing entry
dict['School'] = "DPS School"; # Add new entry
print "dict['Age']: ", dict['Age']
print "dict['School']: ", dict['School']
```

Examples:

a) Create a dictionary which has at least 5 items. Print it.
>>> num={1:'one',2:'two',3:'three',4:'four',5:'five'}
>>> print(num)
{1: 'one', 2: 'two', 3: 'three', 4: 'four', 5: 'five'}

b) Update any one of the item. Print it.
>>> num={1:'one',2:'two',3:'three',4:'four',5:'five'}
>>> print(num)
{1: 'one', 2: 'two', 3: 'three', 4: 'four', 5: 'five'}
>>> d={2:"Two"}
>>> num.update(d)
>>> print(num)
{1: 'one', 2: 'Two', 3: 'three', 4: 'four', 5: 'five'}

c) Add one more item. Print it.
>>> num={1:'one',2:'two',3:'three',4:'four',5:'five'}
>>> print(num)

```
{1: 'one', 2: 'two', 3: 'three', 4: 'four', 5: 'five'}
>>> d1={6:"Six"}
>>> num.update(d1)
>>> print(num)
{1: 'one', 2: 'two', 3: 'three', 4: 'four', 5: 'five', 6: 'Six'}
```

d) Delete a particular item mentioning key value. Print it.

```
>>>num={1: 'one', 2: 'two', 3: 'three', 4: 'four', 5: 'five', 6: 'Six'}
>>>print(num)
{1: 'one', 2: 'two', 3: 'three', 4: 'four', 5: 'five', 6: 'Six'}
>>> del num[6]
>>> print(num)
{1: 'one', 2: 'two', 3: 'three', 4: 'four', 5: 'five'}
```

e) Delete the first item without mentioning key value. Print the dictionary.

```
>>>person = {'name': 'Phill', 'age': 22, 'salary': 3500.0}
>>>result = person.popitem()
>>>print('person = ',person)
person =  {'name': 'Phill', 'age': 22}
>>>print('Return Value = ',result)
Return Value =  ('salary', 3500.0)
```

f) Remove all items from the dictionary.

```
>>> num={1:'one',2:'two',3:'three',4:'four',5:'five'}
>>> num.clear()
>>> print(num)
{}
```

g) Delete the dictionary.

```
>>> num={1:'one',2:'two',3:'three',4:'four',5:'five'}
>>> del num
>>> print(num)
Traceback (most recent call last):
  File "<pyshell#17>", line 1, in <module>
    print(num)
NameError: name 'num' is not defined
```

h) Create a dictionary with each item being a pair of a number and its cube. Do it in single line of code.

```
>>> d={i:i**3 for i in range(1,10)}
>>> print(d)
{1: 1, 2: 8, 3: 27, 4: 64, 5: 125, 6: 216, 7: 343, 8: 512, 9: 729}
```

i) Do the same as above only for odd numbers.

```
>>> d={i:i**3 for i in range(1,10,2)}
>>> print(d)
{1: 1, 3: 27, 5: 125, 7: 343, 9: 729}
```

h) Print all items and keys of the dictionary.

```
>>> d = {'a': 100, 'b':200, 'c':300}
>>> d.keys()
dict_keys(['a', 'b', 'c'])
>>> d.items()
dict_items([('a', 100), ('b', 200), ('c', 300)])
```

j) Calculate the length of the dictionary.

```
>>> d = {'a': 100, 'b':200, 'c':300}
>>> len(d)
3
```

k) Sort the items in the dictionary.

```
>>> pyDict = {'e': 1, 'a': 2, 'u': 3, 'o': 4, 'i': 5}
>>> print(sorted(pyDict, reverse=True))
['u', 'o', 'i', 'e', 'a']
```

l) Create two dictionaries. Concatenate them.

```
>>> d1={1:100,2:200,3:300}
>>> d2={4:400,5:500}
>>> d1.update(d2)
>>> print(d1)
{1: 100, 2: 200, 3: 300, 4: 400, 5: 500}
```

m) Pop an element not present from the dictionary, provided a default value.

```
>>>sales = { 'apple': 2, 'orange': 3, 'grapes': 4 }
>>>element = sales.pop('guava', 'banana')
>>>print('The popped element is:', element)
The popped element is: banana
>>>print('The dictionary is:', sales)
The dictionary is: {'grapes': 4, 'orange': 3, 'apple': 2}
```

1. Write a program to check whether an item is present or not.

```
dict = {'a': 100, 'b':200, 'c':300}
key=input(“Enter a key:”)
if dict.has_key(key):
  print "Present, value =", dict[key]
else:
  print "Not present"
```

2) Write a program to print all the items of the dictionary using loop.

```
statesAndCapitals = {
                'Gujarat' : 'Gandhinagar',
                'Maharashtra' : 'Mumbai',
                'Rajasthan' : 'Jaipur',
                'Bihar' : 'Patna'
               }
print('List Of given states:\n')
```

```
 # Iterating over keys
for state in statesAndCapitals:
   print(state)
```

3) Write a program to map two lists (one containing color names and the other containing color codes) into dictionary.

```
keys = ['red', 'green', 'blue']
values = ['#FF0000','#008000', '#0000FF']
color_dictionary = dict(zip(keys, values))
print(color_dictionary)
```

Assignment:

1) Write a program to get the maximum and minimum value in a dictionary.
2) Write a program to store student data in dictionary (name, class, subjects). Remove duplicate entries.
3) Write a Python program to concatenate following dictionaries to create a new one using loop.
4) Write a Python program to multiply all the items in a dictionary.
5) Write a Python program to sort a dictionary by key.
6) Write a Python program to check a dictionary is empty or not.
7) Write a Python program which creates two dictionaries. One that stores conversion values from meters to centimeters and the other that stores the reverse.
8) Write a Python program that inverts a dictionary, i.e., it makes key of one dictionary value of another and vice versa.

Questionnaires:

1. What are the advantages of dictionary over list?