MA1008 Introduction to Computational Thinking
Week 7 Tutorial: Composite data types - List, Tuple and Dictionary

There are more questions here than can be discussed within one hour in class. Discuss the first five questions in class. Students are to attempt the rest of the questions on their own.

1. i. What are mutable and immutable types? Lists the types you know for each.
   ii. What are iterables? List the ones you know.

2. Write Python code to create a list of the squares of all numbers between 1 to 20.

3. Tuples are immutable. Yet, we can modify the tuple in the list `L = [1, (2, 3), 4]` to `L = [1, (5, 6), 4]`. Why?

4. Create a dictionary that uses the integers 1 – 12 as keys for the months in words from January to December. Then print the months in words using the keys.

5. Consider the following code:
```
list1 = [1, 2, 99]
list2 = list1
list3 = list2
list1 = list1.remove(1)
print(list3)
```
   i. What is printed?
   ii. Modify the code so that `list3` is unchanged.

6. What will the following list return?
```
[ (n*n) for n in range(13) if (n%2==0)]
```

7. What can be done with lists that cannot be done with strings? Name three valid operations for each.

8. What are printed in the following code:
```
langs = ["Python", "C++", "Fortran", "Algol", "Java"]
print (langs)
del langs[1]
print (langs)
del langs[:]
print(langs)
```

9. The following code attempts to convert the list `[1, 2, 3, 4]` to the string `"1234"`, but it doesn't work. Fix it.
```
L = [1, 2, 3, 4]
newString = "".join([a for a in L])
```

10. i. Is it possible to have a tuple as a member of a list? Why?
    ii. Is it possible to have a list as a member of a tuple? Why?
    iii. What differentiates a tuple from a list?