

# COL100: Lab 12

## Object Oriented Programming

April 6, 2017

### Part 1: Programming Questions

Reference = [https://www.tutorialspoint.com/python/python\\_classes\\_objects.htm](https://www.tutorialspoint.com/python/python_classes_objects.htm)

1. Write a Python program to create an Employee class containing name, salary and employee id. Also, define class methods to a) add an employee b) print details of an employee c) edit salary.
2. Write a Python program to create a 2D-Vector class containing both the elements of the vector. Also, define class methods to a) add, subtract, multiply two vectors b) print value of the vector c) compute magnitude of the vector.
3. A binary tree is a data structure defined as follows: A tree is composed of the following nodes:

```
1 class TreeNode(object):
2     def __init__(self, value):
3         self.left = None
4         self.right = None
5         self.data = value
```

A Node of a tree can have either another treenode or None as its left and right child. A node having no parent is called the root (10 is the root in the following tree A node whos both children are None is called a leaf node (3, 7, 18, 26 are leaves) All non leaves are called internal nodes. Write a class MyTree to construct the following tree:

```
1      10
2     /  \
3    5    16
4   /  \  /  \
5  3    7 20
6     /  \
7    18  26
```

Here is some to get you started:

```
1 root = Tree(10)
2 root.left = Tree(5)
3 root.right = Tree(16)
```

**Write the following recursive functions:**

- (a) **getSum** in MyTree that computes the sum of all elements in the tree (recursive function).
- (b) **getMax** to find the maximum value in a tree
- (c) **printLeaves** to print all leaves
- (d) **largestInternal** to get largest internal node
- (e) **largestPathSum** to find the largest root to leaf path in the tree