

Python Review

IT Workshop 3
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Topics

- **Data types:** numbers, strings, lists, dictionaries, tuples, files
- **Control:** if, while, for, functions, generators
- **Modules:** sys, os, shelve, math, re
- **Advanced:** Functional & OO programming

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Exam Problem 1

Argument passing mechanism in python?

Names are passed using call by value, values are passed using call by reference.

```
def func(s):  
    s = [4, 5, 6]  
s = [1, 2, 3]  
func(s)  
print s  
o/p: [1, 2, 3]
```

```
def func(s):  
    s[0] = 4  
s = [1, 2, 3]  
func(s)  
print s  
o/p: [4, 2, 3]
```

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Exam Problem 2

```
def union(x, y):  
    z = []  
    for i in x:  
        if i not in z:  
            z.append(i)  
    for i in y:  
        if i not in z:  
            z.append(i)  
    return z  
  
print union("abcd", ('e', 'f', 'g', 'h'))
```

#00-Feature: polymorphism

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Exam Problem 3

Consider an $n \times n$ chess board where each row has two pawns at locations specified by a list of tuples named positions. Each tuple in positions is of length 2, specifying the two positions in each row where the two pawns are located.

```
def prettyprint(positions):  
    for i in positions:  
        print '.' * i[0] + 'X' + '.' *  
            (i[1]-i[0]-1) + 'X' + '.' * (n-i[1]+1)
```

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Exam Problem 4

Consider a binary tree.

(a) Define a node class in python to encapsulate a node in a binary tree. Each node has 3 fields: data, leftchild and rightchild. Write a suitable constructor to supply the data and create dummy left and right children initialized to 0.

```
class Node:  
    def __init__(self, data):  
        self.data = data  
        self.leftchild = 0  
        self.rightchild = 0
```

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Exam Problem 4 (contd)

- (b) Define a method for the Node class named makeLeft that creates the left child node containing a data field initialized to 0. The method should return the new node created.

```
def makeLeft(self):  
    self.leftchild = Node(0)  
    return self.leftchild
```

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Exam Problem 4 (contd)

- (c) Define a method named show for the Node class that prints the data field of a node and of all its children in an in-order fashion.

```
def show(self):  
    if self.leftchild:  
        self.leftchild.show()  
    print self.data  
    if self.rightchild:  
        self.rightchild.show()
```

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Lab Assignment for Week 1

- Implement a binary search tree data structure in python.
- Write methods to insert nodes, delete nodes. Also write methods for in-order and pre-order traversals. Use generators for the traversals. Finally write a method to search for a given element in the search tree.
- The main program should take 2 lists of numbers as input. The first list is used to populate the tree. The second list of numbers should be searched for in the tree.
- The output is 3 lists. The first list contains zeros and ones depending on the search results. The second list contains the in-order traversal of the tree and the third list contains the pre-order traversal.

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Example input and output

i/p: [2,5,4,9,11] [4,2,1]

o/p: [1,1,0] [inorder-traversal sequence]
[preorder-traversal sequence]

Follow this format as your assignment will
be evaluated automatically.

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