**Principles of Programming I Notes**

**Week 01 – Basics**

Division: 105 / 10 = 10.5

Floor division: 105 // 10 = 10

Modulus: 105 % 10 = 5

Syntax error: print(“Hello)

Runtime error: print(2 + “2”)

Semantic error: print(“3 x 3 equals”, str(3\*\*3))

**Week 02 – Program Control**

Fruitful function: return results

Void functions: don’t return a value

**Week 03 – Collections**

Lists: mutable

Strings: immutable

Tuples: immutable

**Week 04 – Memory and References**

If the aliased object is mutable, changes made with one alias affect the other.

Stack small items (integers, strings…)

Heap large items (lists, dictionaries...)

**Week 05 – Recursion**

Week 06 – I/O and Exceptions

file.read(x) reads x symbols (or bytes)

file.readline() reads first line

file.readlines() reads whole file

**Week 07 – Software Development**

Unit test what piece of code needs to be fixed

Integration test what piece of application is not working

Acceptance test application is not doing what was supposed to do

Regression test application no longer behave the way it used to

TDD design → test → code

**Week 08/09 – OOP**

Operators overloading

\_\_add\_\_ add

\_\_init\_\_ constructor

\_\_eq\_\_ =

\_\_repr\_\_ print

**Week 10 – Functional**

**Week 11 – Data Structures**

Stack LIFO, last-in-first-out

operations: push, pop, peek, is\_empty, size

Queue FIFO, first-in-first-out

operations: is\_empty, enqueue, dequeue, size

Linked lists sequence of items

**DATE OF EXAMINATION: Friday, 7th June 2019 2019**

Question 1

For each of the following code snippets, indicate what will be the data type of x after

the line x =... is executed.

#a) x = 5+6 integer

#b) x = 56//10 integer

#c) x = input("Enter a number:") string

#d) x = float(input("Enter a number:")) float or error

#e) a = "130" x = a / 10 error

#f) a = 10 x = (a == 5) bool

#g) x = [1,2,3] + [3,4,5] list

#h) a = [1,2,3] b = [3,4,5] x = [a,b] list

#i) a = "ABC" b = "DEF" x = {a,b} set

#j) x = {1: "ABC", 2: "DEF"} dictionary

#k) x = [2\*y for y in range(0,10)] list

#l) x = (2\*y for y in range(0,10)) generator

Question 2

Consider the following recursive function:

def fun(n):

if n < 10: return n

else: return fun(n//10) + n%10

Assume that the function is only used with positive integers n.

(a) Indicate what will be the returned as a result of fun(7), fun(45), fun(314),

fun(6474)

fun(7) = 7

fun (45) = 9

fun (314) = 8

fun(6474) = 21

(b) Find the best sentence (at most 10 words) explaining the purpose of this function.

It sums the digits in the x digit number.

DATE OF EXAMINATION: Monday, 30th April 2018

Q2:

def doublelist(nlist):

for i in nlist:

print (str(i\*2))

for el in range(1, 11):

print("")

for el2 in range(1, 11):

print(el \* el2, end=" ")

for el in range(1, 101):

if el % 7 != 0 and str(7) not in str(el):

print(el)

REPL – read eval print list

TDD – test driven development

abc = "abcdefg"

2:4 cd

5: fg

:5 abcde

-3:-1 ef

lambda: x = x\*2

Glossary

Algorithm - process of solving a problem

Errors:

* Runtime error - error that happened during execution of a program.
* Semantic error - program run without errors, but it behaves not as expected.
* Syntax error - error due to wrong syntax, like missing paranthesis. In this case program is not able to run.

Function – operation that is not part of an object

Method – operation that is part of an object

Object – instance of a class

Program - a sequence of instructions how to perform computation.

Statement - a unit of code that has some effect

Variables:

* Initialization - assignment of initial value
* Update - assignment of new value which base on old value
* Reassignment - assignment of new value which does not base on old value