SAINT MARY'S UNIVERSITY SINCE 1802 One University. One World. Yours.	**Department of Mathematics and Computing Science** **CSCI 3430.1 - Principles of Programming Languages**

Assignment #9

Assigned : 13 November, 2017
Due : 21 November, 2017

Please add all source code into one big zip file and post that to Moodle, it won't take more than **ONE** file. If it's too large to upload to Moodle, you likely have more stuff in the zip than just .python source code. Be sure to CLEARLY indicate in the code which version of python you are using in a comment in the source code (likely python v2.7.5, v2.7.10 or v3.3.3).

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1. (1 pts) Write a Python function fOnly that uses a **list comprehension** (yes it's kind of lisp-like) to filter a list of elements of different types and returns only the elements in the list that are of type float. (I suggest using isinstance). This can easily be a one-line function. You should be able to call it from the command line like:

```
>> fOnly([1.0, 2, 3.0, 'cat', 'a', 4, 5])
[1.0, 3.0]
```

2. (1 pts) Write a Python function accepts an integer x and returns a list of all composite numbers up to x. (that is any numbers up to and including x that are **not** prime numbers). I suggest using the built-in "filter" function and a lambda expression.

```
>> fNonPrimes(10)
[4, 6, 8, 9, 10]
```

3. (2 pts) write a Python program that prompts for two text strings, speed limit and the speed you are going. The code should check if both are positive integer numbers and return an error string if it is not (don't just throw the standard error string, use exception handling to catch it and display the reason as something like "cannot be float", "string is not a number", "number is less than zero").Once both are known to be positive integers, the code calculates the likely speeding fine if the cops can catch you based on:

    $0 for any speed equal or below the speed limit
    $200 for any speeds less than 5 km per hour above the speed limit
    $500 for every additional km per hour between 5 and 20 km per hour above the speed limit
    $1000 for every additional km per hour above over 20 km per hour above the speed limit
    $0 for any speed greater than 400 km per hour (You are in a Bugatti so they can't catch you).

4. (3 pts) Write a "hello world" Python program in python as a GUI messagebox with corner click or OK button to dismiss it. You can use any python GUI library you would like (suggestions would be TkInter, ctypes, WxPython, PyGame, Pyglet, PyQt, Glade or whatever new GUI lib has cropped up in the past year). Be sure to include comments on which GUI library and version you used and what python version you used. This is especially important as not all libs are available for all revs of python.

5. (3 pts) write a Python program that spawns two threads, one which repeatedly writes the time of day as an HH:MM:SS string into a global variable 100 times per second. The second thread will repeatedly read the time of day string from that variable **twice** per second and try to display it to screen but code in that thread should ensure the same string is never written twice in a row. The result is that second thread really displays to screen only **once** per second. The program will need to use the lock function to mutex the variable and should use the python time and thread libs. Try and implement some method to shut the application threads down gracefully, killing both threads before the main program thread exits. A loop control variable does that nicely.

NOTE: There’s only one more lab possible after this. I would try and hand in anything you get done, even if it is only partially working. Not many more chances left to get any points.