**ECE 3822: Engineering Computation II**

# Homework No. 14: Functional Programming in Python

As an introduction to this assignment, please review the following tutorial:

*http://anandology.com/python-practice-book/functional-programming.html*

Provide solutions for the first 5 problems in this tutorial using a functional programming approach:

1. Implement a function product to multiply 2 numbers recursively using + and -operators only.
2. Write a function flatten\_dict to flatten a nested dictionary by joining the keys with “.” character.

>>> flatten\_dict({'a': 1, 'b': {'x': 2, 'y': 3}, 'c': 4})

{'a': 1, 'b.x': 2, 'b.y': 3, 'c': 4}

1. Write a function unflatten\_dict to do reverse of flatten\_dict.

>>> unflatten\_dict({'a': 1, 'b.x': 2, 'b.y': 3, 'c': 4})

{'a': 1, 'b': {'x': 2, 'y': 3}, 'c': 4}

1. Write a function treemap to map a function over nested list.

>>> treemap(lambda x: x\*x, [1, 2, [3, 4, [5]]])

[1, 4, [9, 16, [25]]]

1. Write a function tree\_reverse to reverse elements of a nested-list recursively.

>>> tree\_reverse([[1, 2], [3, [4, 5]], 6])

[6, [[5, 4], 3], [2, 1]]

Submit your solutions in: */data/courses/ece\_3822/current/homework/hw\_14/<lastname\_firstname>*. The program names should be p01.py, p02.py, ..., p05.py.