ENGN 2020:

Homework #0

Brown University School of Engineering

Assigned: January 24, 2019, Due: January 28, 2019

This short assignment is intended to make sure you can get up and running with python before the first "real" homework is assigned. This homework is entirely electronic; nothing needs to be turned in if you see the points have been awarded online.

This assignment is purely a bonus—if you complete it and receive all the points, you can use it to replace your lowest other homework assignment in the course.

Problem 1

First, get a working installation of python by any means you choose. If you want an easy installation method on your own computer, consider the Anaconda[1] package, which is a "one-click" installer. Otherwise, use python through a web-based interface like pythonanywhere[2]. These instructions will primarily focus on the use of pythonanywhere, since this solution should work for everyone (although we recommend creating your own installation). In this class, we will officially use version Python 3.6, although any recent version of Python 3 should work. Make sure you have the following packages installed:

- *numpy:* (numeric python) for creating matrixes, vectors, etc. and basic arithmetic operations like sin, etc.
- *scipy:* (scientific python) for scientific computing, linear algebra, optimization, etc.
- *matplotlib:* (matrix plotting library) to create high-quality figures

You can verify they are installed by opening a python interpreter (in pythonanywhere, open a Bash console and type 'ipython3') then typing the commands at the prompts. If they run without errors, your installation works, and you can exit the python interpreter by typing `exit()`.

```
>>> import numpy
>>> import scipy
>>> import matplotlib
```

Next, install the homework submission module[3] for this class. For pythonanywhere, do so by opening a Bash console then running the command:

[1] Avaliable at `https://www.anaconda.com/download/`

[2] Available at `http://www.pythonanywhere.com`

[3] You can see it at `https://bitbucket.org/andrewpeterson/autograder`

```
pip3 install --user git+https://andrewpeterson@bitbucket.org/andrewpeterson/autograder.git
```

In a python interpreter type the below command to verify that it installed.

```
>>> import submission
```

Next, verify that you can log in to our class's grading system with the username and password you have been provided. To do this, use the commands below to import the `setup` function and run it by typing its name followed by empty parentheses:

```
>>> from submission.client import setup
>>> setup()
```

This will prompt you for login information; use:

- *servername:* http://engn2020.pythonanywhere.com
- *username:* your Brown ID ("B" followed by eight numeric digits)
- *password:* provided by the instructor

If you are successful in logging in, it will offer to save these values to your local filesystem so that you don't have to type them in every time.

At this stage, you should be able to check your scores on the current assignment with the function `check_score`, as below:

```
>>> from submission.client import check_score
>>> check_score()
```

You should see two entries, corresponding to parts 1a and 1b. Your score will be blank since you have not yet submitted anything.

Part a. Here, you'll write a simple function in python and verify that you can both submit it and get credit for it. Like a mathematical function, a python function can take in values, use them internally, and return an output. A function in python is defined by `def` and the commands inside it are indented with four spaces; the returned value is prefixed by `return`. The example function below creates a customized greeting string.

```
def hello(word):
    """A function that takes in a word and says hello to it."""
    phrase = 'Hello, ' + word + '!'
    return phrase
```

You can type in a function inside a python interpreter, then try calling your function to make sure you understand how it works.

However, it's usually easier to type the function into a text file so that you can save and check your work. *E.g.*, in pythonanywhere, click "Browse files", create a new directory for this assignment (like 'hw0_1a'), then create a new file (like 'run.py'). This should open a text file where you can type your function followed by any commands that use your function; *e.g.*,

```
phrase = hello('world')
print(phrase)
```

After you are satisfied that your function works as you intend, you can submit this for grading. (You can submit as many times as you like, correct answers override incorrect ones!) Just include the following commands to submit, where the arguments to the `submit` function should be self-explanatory.

```
from submission.client import submit

submit(function=hello, assignment='hw0_1a')
```

You should receive feedback on if you got the answer correct, and you can call `check_score` as before to verify your score was recorded. In future problems, we'll provide info on what to submit in a box like so:

Submission

Label: hw0_1a
Points: 5
Input variables: `word` (string)
Output: a string

Part b. Write a function to determine if an integer is even or odd. That is, it should take in a number `x` (like 8 or 621) and return 0 if it is even (divisible by 2) and 1 if it is odd. Hint: you may need to look up the "modulo" operator in python to complete this.

Submission

Label: hw0_1b
Points: 5
Input variables: `x` (integer)
Output: 0 or 1

Problem 2

(Ungraded.) If you have not previously used python, find an online tutorial or two and work through it. If you have a background in matlab, you may want to look for a python tutorial for matlab users.