CS3388 ASSIGNMENT 4

Due date: Friday Apr. 3rd 2020, at 11:00pm.
Weight: 10% of final mark

The purpose of this assignment is to complete a ray tracing program that displays spheres and computes shadows generated by objects. For this purpose, you are required to:

- Add a method `minimumIntersection` to the class `cameraMatrix`. For a given ray, this method finds the *t*-values of the intersections that the ray makes with the objets in the scene. It returns the minimum *t*value, along with the object for which this intersection belongs.
- Complete the constructor and the helper method in class `shader`. For a given ray (and its corresponding pixel *(i,j)* in the image) the constructor computes the color for the pixel *(i,j)* by applying a shading model identical to that employed in Assignment 3.

  The helper method `__shadowed` determines if a particular pixel in in the shadow of other objects, or itself. It does so by forming a ray from the intersection point in the direction of the light source. If any object is intersected by the ray, then the pixel is in shadowed, and the pixel is shaded using ambient light only.
- In order to program this properly, algorithms for the method `minimumIntersection`, the class `shader` constructor, and its helper method `__shadowed` are provided in this document.

Here are some general considerations concerning this assignment:

- The sum of the Python code needed for this assignment can be found in OWL under Resources, Python Code, Assignment 4.
- You must not change the provided classes that are complete, nor the provided file names and class names. In addition, exactly follow the instructions as to the naming of the files and classes you will have to program for this assignment.
- The test program for this assignment is `Assign4.py` and is found with the rest of the provided code.
- Executing `Assign4` should result in an image identical to this one
- Use OWL to submit the file `myAssignment4.py`. This file must contain the following classes:
  - `cameraMatrix`
  - `shader`

You must use Python 3.7 and PyCharm 2018.2 or above for this assignment. Before submitting your assignment, please refer to the assignment marking scheme and submission guidelines.