The University of Texas at San Antonio

**Spring 2019**

**COURSE NO.: GEO 6533 STUDENT: ………………….……………………**

**Final Exam Due Sunday May 12 at Midnight**

*Below are the questions for your final exam, you should start with the easiest question first, and please make sure that your scripts run correctly and that you create the folders and directories below. Also Make sure when you unzip the Exam folder to put it directly under your C drive, failure to do so will cost you points.*

*See below the Folders and Paths that you should have.*

*You should Submit one zipped folder or directory with all necessary folders inside, Please Make sure to remove Original data given for the exam, all is needed from you is a word document and your scripts. See Submission Detail a the end of this document.*

**Question (1)** **20 points**

The files in the folders “**ims\_data\_2008**” and “**ims\_data\_2009**” are esri grid files, for snow cover from the satellite product **IMS** for the first 15 days of 2008 and 2009. These files cover the entire northern hemisphere.

**Note:** The grid values for the IMS products are: ***1 (sea), 2 (land), 3 (sea ice), 4 (snow), and 0 for outside Northern Hemisphere***, the grid files represent the **daily** snow cover extent.

First unzip and put the folder named **“GEO6533Final” directly under your “C” directory**, then create another folder **directly** under your **C Drive** and give it a name such as “**LastNameFinal**” and put all your codes and necessary result folders inside it.

**All your python script files** should be in a different folder called “**LastNameScripts**” after replacing the part “**Lastname**” in the folder name “**LastnameScripts**” with your own **Lastname**, Do it through a small **python script** “**ChangeFolderName.py**” .

C:\ GEO6533Final\

C:\ LastnameFinal\LastnameScripts\

C:\ LastnameFinal\LastnameScripts\ ChangeFolderName.py

You should have the following folders:

*a****-*** *“****ims\_data\_2008****” and “****ims\_data\_2009****”*

*b-“****clipped\_ims\_2008****” and “****clipped\_ims\_2009****”*

*c- The last folder should be called “****gis\_files****”, and should contain the US shapefile.*

C:\ LastnameFinal \ clipped\_ims\_2008\

C:\ LastnameFinal \ clipped\_ims\_2009\

**1-**Write a python script that create **text file with all the files names** in each folder (**2008** and **2009**). You can either user ArcGIS raster listing function or just python listing function.

**2-**Write a second python script to “**subset**” (or clip) each grid file to the **conterminous US**, and **name the new files** like this:

“**usa\_2008001**” for the first one and

“**usa\_2008002**” for the second one and so on

**3-** Present you results and very briefly discuss the snow cover differences between 2008 and 2009, show necessary work steps and maps or other material you think is useful for your analysis.

*Note: A small paragraph or two will be enough for the description of the results.*

**Question (2)** **30 points**

You are asked to create a class to calculate the salary “**SalesSalary.py”** of a sales person and test your class in a script called “**SalesSalaryTest.py**”.

C:\ LastnameFinal\LastnameScripts\ SalesSalary.py

C:\ LastnameFinal\LastnameScripts\ SalesSalaryTest.py

All your Python files (class and test script) should be in the folder “**LastnameScripts**” off course after changing the folder name (at this point you already did it in Question 1)

Salespersons work on commission, and their salary depends on the commission rate, which is as follow:

For sales **greater or equal** to 20,000 then rate = 0.15 .

For sales **greater or equal** to 15,000 then rate = 0.10 .

For **other** sales the rate = 0.05 .

Detailed requirements:

You must write a program for two Classes: **1)** **SalesSalary** and **2)** **SalesSalaryTest** .

In the class **SalesSalary.py** you must have :

(i) Class arguments: **mySalary**, **mySales**, **myRate** ,

(ii) Class methods: **calculateSalary**, **getSalary**, **getRate**, **setSales**

In **SalesSalaryTest.py),** you must:

i). Ask user to input the **sales amount** **should be a double value**, from keyboard;

ii). If the sale amount is a **positive number** (this means you need to test it), create an object of class **SalesSalary**, calculate the salary and print out the information (sale amount, commission rate, and salary):

iii). If the sale amount is a **negative number**, print out message “**invalid sale amount**”.

When testing your program, you should input the following values, and copy the output to here;

i). -12000;

ii). 10000;

iii). 18000;

iv). 30000;

**Question (3)** **20 points**

This Question is to test your ability to write a successful Python geoprocesing scripts. You are given a set of rainfall radar data “**kewxMarch07Shapefiles**”. You will need to write **three short python scripts**:

**First write a small code to create two folders** ( see folders names below) **inside your “LastnameFinal” folder**, can you test if the folders already exist, if they do not then create them using the Python make directory function.

a- ClippedKEWX

b- ExportedKEWX

C:\ LastnameFinal\ClippedKEWX\

C:\ LastnameFinal\ExportedKEWX\

C:\ LastnameFinal\LastnameScripts\ TestFolderExistence.py

**1- DefineProjection.py:** to define the coordinate system of all KEWX shapefiles, use WGS 1984. Make sure for each file when the Define Projection tool is run successfully you print that to the screen along with the file name just processed.

C:\ LastnameFinal\LastnameScripts\ DefineProjection.py

**2- Intesect.py:** Use the **projected KEWX shapefile** to intersect (**clip**) them with the precipitation rain gauges file given to you. (output of each clip or intersect should be a point file), again print to the screen the name of the file you are processing and add the suffix (**\_clip**) to the output files.

Outputs of this tools should go to the folder “ClippedKEWX”.

C:\ LastnameFinal\LastnameScripts\ Intesect.py

**3- ExportAll.py:** Write a code to export all attributes to a text file for each clipped file, use ArcMap appropriate tool.

C:\ LastnameFinal\LastnameScripts\ExportAll.py

Note in this step some files maybe empty (i.e. they will not have any row in their attribute table), this means you **need to test** for this, and print to the screen if the file your are processing has any rows or not and (and the **rows count**). Find the right ArcMap tool to do this,

Note: *Before running the Export tool, you will need to test that each file has records, if file do not have records then it will be skipped and not processed, if you do not test for each file and while attempting to run the Export tool, you script will crash, a situation that we want to avoid.*

All your scripts should be in the folder “**LastnameScripts**” off course after changing the folder name (at this point you already did it in Question 1).

**Question (3)** **30 points**

Basic programming skills with Python.

1. [**10 points**] Write a code for a simple program “**UserString.py**” which will **read a string from the keyboard** and **print it out on the screen,** you **should test** that the user input is only **Alphabetical**.

The code should be a **complete program** that can run; that is, if the user uses numbers and/or other characters non alphabetical, your code should print back to the screen “**Wrong input, please try again**”. If the user input is strictly alphabetical then print it to the screen with a simple message.

C:\ LastnameFinal\LastnameScripts\ **UserString.py**

1. [**10 points**] Write a section of code to define a function ‘**Student**’, where each student should have **two data instances** (arguments), one for the **student’s name**, and one for the **student numerical final grade**.

The Student function, should have the method ‘**ConvertGrade**’, which should return the **letter grade** for the student following the rules below:

C:\ LastnameFinal\LastnameScripts\ **ConvertGrade.py**

a). for students with final grade no less than 95, return ‘A’;

b). for students with final grade less than 95 but no less than 80, return ‘B’;

c). for students with final grade less than 80 but no less than 65, return ‘C’;

e). for student with final grade less than 65 but no less than 55, return ‘D’;

f). otherwise, return ‘F’.

Write a section of code called “**StudentGrade.py**”to implement the function, use the following grades for testing ( 97, 83, 71, 60 and 54)

C:\ LastnameFinal\LastnameScripts\ **StudentGrade.py**

1. [**5 points**] Write a section of code to compute the summation of all integer numbers between 10 and 20 (inclusive). You need to use the **while-loop**.

C:\ LastnameFinal\LastnameScripts\ **SumNumebrs.py**

Submission Details

After running and carefully testing all your scripts and geoprocessing results, you will need to clean all results folder named “LastNameFinal”, meaning **delete the following folders**:

Clipped\_ims\_2008

Clipped\_ims\_2009

ClippedKEWX

ExportedKEWX

The python scripts you wrote for creating these folders would be used to recreate them

Your folder called “LastNameFinal” containing your word document should be zipped and uploaded to BlackBoard.

DO NOT INCLUDE ORIGINAL EXAM DATA FOLDERS GIVEN TO YOU,

I have the data and the same paths as you do, so it should be easy to run your scripts if you followed instructions.

Failure to follow correct paths and folders instructions may cost you a loss of points.

Please take your time and review everything before you submit you final exam results and answers.

Good Luck!