Course: **CVE 593 – Special Topics in Civil Engr**
Task: **Homework #4**
Due Date: **December 16, 2022 at 11:59 PM**

Problem 1 (50 Points)

Traffic safety is a major national concern in the transportation industry and the public in general. For instance, more than 36,000 people's lives are lost every year due to motor vehicle crashes and three million more people sustaining injuries in the United States. To prevent a crash to occur, their locations and causes must be well understood. This starts by identifying the hot spot areas with high crash rate or fatality. When the hot spot areas are identified, transportation officials evaluate the risky characteristics associated to develop effective and appropriate safety measures.

Task: Use Python particularly geopandas, pandas, and other packages to conduct spatial analysis of crash data.

e.g.,
```python
import geopandas as gpd
import pandas as pd
import matplotlib.pyplot as  plt
%matplotlib inline
%config InlineBackend.figure_format = 'retina'

data = gpd.read_file('.....')
```

a) Create a map to visualize the counties with different colors, choropleth map **(10 Points)**

b) Create a choropleth map indicating the **fatalities rate** with different colors **(10 Points)**

c) Create a choropleth map indicating alcohols related fatality in counties **(10 Points)**

d) Create a choropleth map indicating pedestrians' fatality in counties **(10 Points)**

e) Create a choropleth map indicating **bike fatality rate** in counties **(5 Points)**

f) Create a choropleth map indicating speeding fatality in counties **(5 Points)**

Submit a pdf file of your solution together with your code to receive full points

Data:

Data on BB,

- <mark>*Counties_Georgia*</mark>

    Important attributes for the analysis:

    NAMELSAD10 means *county names*

    totpop10 means *total population based on 2010 census*

    Acres means *County area size in acres*

    Sq_Miles means *County area size in square miles*

- <mark>*vehicle_fatality*</mark>

    Important attributes for the analysis:

    Fatality_bike means *bike fatality*

    Fatality_rate_bike means *bike fatality rate per 100,000 population*

    Fatality_alcoh means *alcohol related fatality*

    Fatality_rate_alcoh means *alcohol related fatality rate per 100,000 population*

    Fatality_ped means *pedestrian fatality*

    Fatality_rate_ped means pedestrian *fatality rate per 100,000 population*

    Fatality_speed means *fatality due to speeding*

    Fatality_rate_speed means *fatality rate per 100,000 population due to speeding*