COM 321 Simulation & Modeling According to Dharmendra Kumar et al. (2020) Corona virus causes respiratory infection including pneumonia, cold, sneezing and coughing while in animal it causes diarrhea and upper respiratory diseases. Corona virus transmitted human to human or human to animal via airborne droplets. Corona virus enters in human cell through membrane ACE-2 exopeptidase receptor. WHO and ECDC advised to avoid public place and close contact to infected persons and pet animals. Firstly Corona virus (2019-nCoV) was isolated from Wuhan market China at 7 Jan. 2020. Use the data set of Covid-19 Pandemic in Africa extracted from WHO website on 22nd January 2021 which copy can be obtained from the following URL: https://github.com/mkumakech/Covid-19\_Pandemic/blob/master/Africa\_Covid.csv You are therefore required to apply knowledge of simulation and modelling to answer the following questions. Take the screen shot of your codes and outputs for each question: 1. Develop Multiple Linear Regression Model to predict the Deaths \_cumulative total using Cases cumulative total, Cases \_newly reported in last 7 days and Cases \_newly reported in last 24 hours features. (5 marks) 2. Visualize the multiple linear regression by show of a graph. (5 marks) 3. Evaluate the multiple linear regression model using: i. R-squared (R^2 ) and ( 5 marks) ii. The Root Mean Squared Error (RMSE) ( 5 marks)

# Import necessary libraries

import pandas as pd

import numpy as np

from sklearn.model\_selection import train\_test\_split

from sklearn.linear\_model import LinearRegression

from sklearn.metrics import r2\_score, mean\_squared\_error

import matplotlib.pyplot as plt

# Load the dataset

data = pd.read\_csv("Africa\_Covid.csv")

# 1. Develop a Multiple Linear Regression Model

X = data[['Cases\_cumulative\_total', 'Cases\_newly\_reported\_last\_7\_days', 'Cases\_newly\_reported\_last\_24\_hours']]

y = data['Deaths\_cumulative\_total']

# Split the data into training and testing sets

X\_train, X\_test, y\_train, y\_test = train\_test\_split(X, y, test\_size=0.2, random\_state=42)

# Create and fit the regression model

model = LinearRegression()

model.fit(X\_train, y\_train)

# 2. Visualize the Multiple Linear Regression

y\_pred = model.predict(X\_test)

plt.scatter(y\_test, y\_pred)

plt.xlabel("Actual Deaths Cumulative Total")

plt.ylabel("Predicted Deaths Cumulative Total")

plt.title("Actual vs. Predicted Deaths Cumulative Total")

plt.show()

# 3. Evaluate the Multiple Linear Regression Model

# i. R-squared (R^2)

r2 = r2\_score(y\_test, y\_pred)

print("R-squared (R^2):", r2)

# ii. Root Mean Squared Error (RMSE)

rmse = np.sqrt(mean\_squared\_error(y\_test, y\_pred))

print("Root Mean Squared Error (RMSE):", rmse)