1.
**********globalcovid19**********

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#!/usr/bin/python

import os, csv
from matplotlib import pyplot as plt
from datetime import datetime

# run shell command to grab current data from Johns Hopkins COVID-19 github repository
os.system('cd COVID-19/; git pull; cd ../')

# iterate through 'Confirmed', 'Recovered', and 'Deaths' data from
# COVID-19
CRD = ['Confirmed', 'Recovered', 'Deaths']

for k in range(3):
    string = CRD[k]
    # initialize path to traverse to desired COVID-19 data file
    path = "//home/pi/ECE331/HW06/COVID-19/csse_covid_19_data/csse_covid_19_time_series/tim
e_series_19-covid-"
    # dynamically append the path
    path = path + string + ".csv"

    # try to open file
    try:
        fh = open(path, "r")
    except:
        print("Error: Can not open file")

    # return reader object to iterate over lines of csv file
    reader = csv.reader(fh)

    # grab header row from csv file (dates for x-axis)
    header = next(reader)
    # truncate header list to only contain dates
    header = header[4:]

    # initialize an empty list to append numerical data
    data = []

    # iterate over each line of csv file (iterator, 'row', is a list)
    for row in reader:
        # truncate each row to only contain numerical data
        row = row[4:]

        # error check: updated data may not have most recent dates data
        if row[-1] == '':
            row[-1] = '0'

        # convert each value from type string to type int and append
        # nested 'row' list to a 'data[]' list
        data.append([int(val) for val in row])

    # grab length of each row (or the number of days the data represents)
    rowlength = len(data[0])
    # initialize list (size of each row) to contain the cumulative, global data
    # of each day
    datasum = [0] * rowlength

    # iterate through ith elemnent of each row list, cumulatively adding the data.
    # store results in 'datasum[]' list
    for i in range(rowlength):
        for vals in data:
            datasum[i] += vals[i]

    # initialize and  append dates in '%m/%d/%y' format using 'datetime' library
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    date = []
    for i in range(len(header)):
        date.append(datetime.strptime(header[i], '%m/%d/%y'))

    # show number of confirmed, recovered, and deaths since most recent date
    print('%s since %s as of %s: ' % (string, date[-2], date[-1]))
    print(datasum[-1] - datasum[-2])

    # plot confirmed cases, recovered cases, and deaths vs. time
    plt.plot(date, datasum, label = '%s' % string)
    # annotate last point of each graph as a visual aid
    plt.annotate('%s' % datasum[-1], xy = (date[-1], datasum[-1]))

fh.close()
plt.xlabel('Date')
plt.ylabel('Number of People')
plt.title('COVID-19 Data vs. Time')
plt.grid()
plt.legend()
plt.show()
```

2.

```
enscript -T 4 -b'ECE 331 Homework 6 %E %*|$%|John Bowen' -O hw06 -o - | ps2pdf - ECE-331-Bo
wen-John-HW-06.pdf
```