```
clc;
clear;

%%Project 1 Nathan Delos Santos
    population = readtable("cali_county_pop.csv");
    vaccines = readtable("covid19vaccinesbycounty.csv");
    partsPer = 1000000;%Parts per Million in this case
    mov = 7;%days
    vaccines.Properties.VariableNames(15) = "New_People_With
 At_Least_One_Dose";
    vaccines.Properties.VariableNames(13)
 = "New_People_Fully_Vaccinated";
    vaccines.Properties.VariableNames(3) = "Total_Doses";
    vaccines.Properties.VariableNames(4) = "Cumulative_Total_Doses";
    vaccines.Properties.VariableNames(6) = "Cumulative_Pfizer_Doses";
    vaccines.Properties.VariableNames(8) = "Cumulative_Moderna_Doses";
    vaccines.Properties.VariableNames(10) = "Cumulative_J&J_Doses";

%%Top Populous Counties
    topNumber = 5;
      %Sets how many counties to look at based on population
    topPop = sortrows(population, "Population", "descend");
      %Puts the most populated counties first
    topPop([topNumber+1:height(topPop)],:) = [];
      %Everything after the top few counties is erased
    topPopNames = topPop.County;
        %Gathers a list of names of those counties. The previous line
 gathered ALL information about the county.
    topPopNames = categorical(topPopNames);
      %makes the array usable elsewhere
    index = [];
      %Creating an array of the indexes of the counties
    for i = 1:topNumber
        index(i) = max(find(vaccines.county == topPopNames(i)));
      %Finds the most recent index of the county in the vaccine table
    end

%%Calling Chart Functions
    barGraphOutput(index,topPopNames,
["Cumulative_Total_Doses"],topNumber,vaccines,"Total Vaccinations")
    barGraphOutput(index,topPopNames,
["Cumulative_Pfizer_Doses","Cumulative_Moderna_Doses","Cumulative_J&J_Doses"],topN
 Vaccinations By Manufacturer")
    percentVax(index,topPopNames,topPop,
["Cumulative_Total_Doses"],topNumber,vaccines,"")
    rollingAvgChart(["New_People_With
 At_Least_One_Dose","New_People_Fully_Vaccinated","Total_Doses"],vaccines,topPopNa

%%Doses Bar Charts
    function [barOutput] =
 barGraphOutput(countiesIndex,countyNames,manufacturers,number,vaxTable,titles)
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```
    %Function that returns a bar graph for a "manufacturer" for
 each county. Takes the inputs: index of counties, county names,
 manufacturers, number of counties, vaccine table, and a title
        cumulative = [];
        vaxName = [];
        colors = [];
        for i = 1:length(manufacturers)
            vaxName=[vaxName,strrep(manufacturers(i),"_"," ")];
      %Removes the underscores "_" from the manufacturer names for the
 legend
            colors=[colors,[rand,rand,rand]'];
      %Randomly generates colors for the many possible manufacturers
        end
        figure;
        for i = 1:number
         %Plots Bars in groups of (how many manufacturers), for each
 county
            for ii = 1:length(manufacturers)
                cumulative(ii) =
 vaxTable{countiesIndex(i),manufacturers(ii)}; %For this one specific
 county, documents the cumulative for each manufacturer
            end
            b=bar(countyNames(i),cumulative);
      %Adds (how many manufacturers) bars at a time
            for c = 1:length(manufacturers)
      %Assigns each bar one of (how many manufacturers) colors.
                b(c).FaceColor = colors(1:3,c);
            end
            legend(vaxName)
      %Adds the legend without the underscores
            hold on
      %Allows for the other counties' bars to be displayed on the same
 plot
            legend show
        end
        title(titles + " By County" + " Up To " +
 datestr(max(vaxTable.administered_date))+ " (Top" + sprintf(" %.0f
 ",number)+ "Most Populous)") %Adds the title. Lets you know how many
 counties, and most recent date.
        ax=gca;
        ax.YGrid = 'on';
        ax.YAxis.Exponent = 0;
        ytickformat("%.0f");
        hold off;
    end
      %Repeats for all counties

%%Percentage Vaccination
    function [barPercent] =
 percentVax(countiesIndex,countyNames,popul,manufacturers,number,vaxTable,titles)
    %Function that returns a bar graph for the percentage vaccinated
 by a "manufacturer" for each county. Takes the inputs: index of
 counties, county names, county population, manufacturers, number of
 counties, vaccine table, and a title
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```
        colors = [];
        vaxName = [];
        figure;
        for i = 1:length(manufacturers)
            vaxName=[vaxName,strrep(manufacturers(i),"_"," ")];
      %Removes the underscores "_" from the manufacturer names for the
 legend
            colors=[colors,[rand,rand,rand]'];
      %Randomly generates colors for the many possible manufacturers
        end
        for i = 1:number
         %Plots Bars in groups of (how many manufacturers), for each
 county
            for ii = 1:length(manufacturers)
                cumulative(ii) =
 100*vaxTable{countiesIndex(i),manufacturers(ii)}/
popul.Population(i); %For this one specific county, documents the
 cumulative percentages for each manufacturer
            end
            b=bar(countyNames(i),cumulative);
      %Adds (how many manufacturers) bars at a time
            for c = 1:length(manufacturers)
      %Assigns each bar one of (how many manufacturers) colors.
                b(c).FaceColor = colors(1:3,c);
            end
            legend(vaxName)
      %Adds the legend without the underscores
            hold on
      %Allows for the other counties' bars to be displayed on the same
 plot
            legend show
        end
        title("Vaccination Percentage By County" + titles + " Up To "
 + datestr(max(vaxTable.administered_date))+ " (Top" + sprintf(" %.0f
 ",number)+ "Most Populous)") %Adds the title. Lets you know how many
 counties, and most recent date.
        ax=gca;
        ax.YGrid = 'on';
        ylim([0,100])
        ytickformat('%g\%')
        hold off;
    end
      %Repeats for all counties

%%Rolling Average Line Charts
    function [roll] =
 rollingAvgChart(factors,vaxTable,countyNames,countyPop,number,parts,moving)
    %Function that returns (how many factors) line plots, displaying
 the factors on a 7 day moving average for each county
        for i = 1:factors.length
      %Loops through one factor at a time
            vaxNumbers = [];
      %Resets the factor numbers after each factor
            for ii = 1:number
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               vaxNumbersIndex = [];
     %Resets the array of indecies after each county
               vaxNumbersIndex = find(vaxTable.county ==
countyNames(ii)); %Finds all of the indecies for that county for that
specific factor. Each index is a day.
               temp = [];
     %Resets the temporary variable for each county
               for iii = 1:length(vaxNumbersIndex)
     %Loops through each day for that county for that factor
                   temp(iii) =
[vaxTable{vaxNumbersIndex(iii),factors(i)}]'; %Adds the factor number
to the temporary array AS A COLUMN. This way, it is easier for humans
to see the divisions for each county.
                   temp(iii) = parts * temp(iii)/
countyPop{ii,"Population"}; %Divides that newly added factor by the
population, and multiplies it by the "Parts Per" variable
               end
               vaxNumbers(:,ii) = temp;
     %Adds the column of factor numbers
           end
           strFactor = strrep(factors(i),"_"," ");
     %Removes the underscores "_" from the factors for the legend
           figure;
           title(strFactor + " Per Day Per "+ sprintf("%.0f",parts)
+ " Up To " + datestr(max(vaxTable.administered_date))+ "(Top" +
sprintf(" %.0f ",number)+ "Most Populous)") %Adds the title. Lets you
know how many counties, and most recent date.
           ax=gca;
           ax.YGrid = 'on';
           for i = 1:length(countyNames)
     %For this one factor, plots ALL top populous counties' stats.
               plotVal = movmean(vaxNumbers(:,i),moving);
     %Creates a rolling avereage of the data. You can choose how many
days to make a rolling average. I chose 7.
               hold on
       %Allows for the other counties' lines to show up on the same
plot.
               plot(vaxTable{find(vaxTable.county ==
countyNames(i)),"administered_date"},plotVal,'DisplayName',string(countyNames(i))
a county's factor stats per day.
               legend show
               legend('Location','northwest')
               title(legend,sprintf("%.0f",moving)+' Day Rolling
Average','FontSize',12) %Titles the legend, letting you know that it
is a rolling average
           end
           xlim([min(vaxTable.administered_date)
max(vaxTable.administered_date)]) %Sets the x limits from the minimum
date t the latest date
           plotVal = [];
     %Resets the rolling average array for the next plot
           hold off
       %Ends the plot so that no new lines will be plotted onto the
same graph
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    end
  %Repeats for all factors
end
```