Data Set Source and Description:

https://www.thebalance.com/unemployment-rate-by-year-3305506

Output from str() function applied to the data object (apply a monospaced font like "Courier New" to the output):

```
tibble [90 × 4] (S3: tbl_df/tbl/data.frame)
 $ year             : num [1:90] 1930 1931 1932 1933 1934 ...
 $ gdp_growth       : num [1:90] -8.5 -6.4 -12.9 -1.2 10.8 8.9 12.9 5.1 -3.3 8 ...
 $ unemployment_rate: num [1:90] 8.7 15.9 23.6 24.9 21.7 20.1 16.9 14.3 19 17.2 ...
 $ inflation        : num [1:90] -6.4 -9.3 -10.3 0.8 1.5 3 1.4 2.9 -2.8 ...
```

Research Questions to be explored:

1) Does unemployment have any direct relation to GDP growth in United States?

2) Does inflation affect GDP growth rate and if so whether a small amount of inflation is beneficial or detrimental to the country?

Statistical Analysis Plan

Population:

US citizens who are aged 16 years and above who fall in one of the two categories:

1) Employed: in the labour force or are currently looking for one and are contributing to the national income.

2) Unemployed:
   (a) Long term unemployed – people who are unemployed and in search for job for more than four weeks
   (b) Marginally attached to the labour force – people who are unemployed and haven't searched for job in last four weeks but sometime in the past year
   (c) Discouraged workers – people who are unemployed and searched for job in the past year, but not in last four weeks and those who would like to have a full-time job but don't have any due to old age, lack of skills or discrimination.

Primary Objective:

To assess how the rise or fall in unemployment can affect the GDP growth rate

Secondary Objective:

To estimate how over time, rise in inflation causes decrease in growth in GDP

Data Collection methods:

From a website primarily focussing on finance and budgeting,
https://www.thebalance.com/unemployment-rate-by-year-3305506

Variables under consideration:

1) **Primary Response Variable**: GDP growth rate over the years from 1929 to 2019

Primary Explanatory Variable: Unemployment rate

2) **Secondary Response Variable**: GDP growth rate over the years from 1929 to 2019
   Secondary Explanatory Variable: Inflation

Missing data procedures:

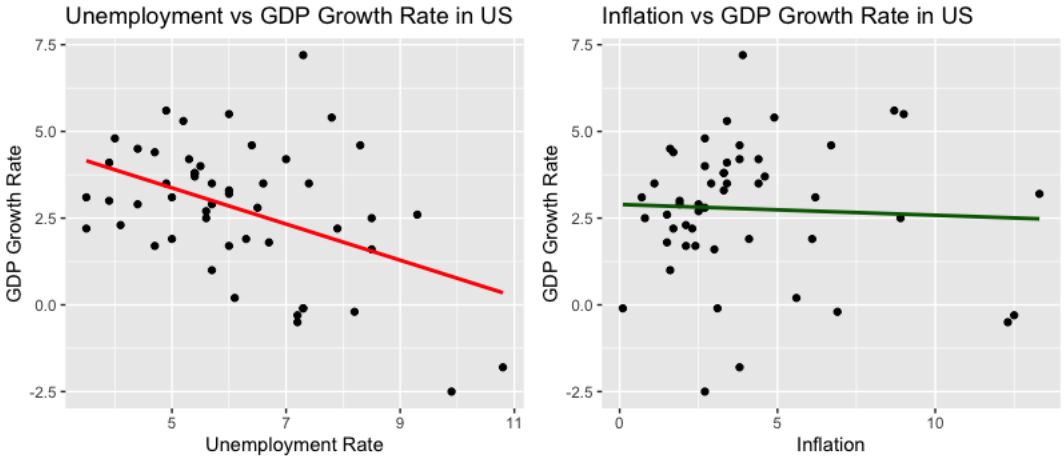
None mentioned or observed missing in the source where the data was collected from

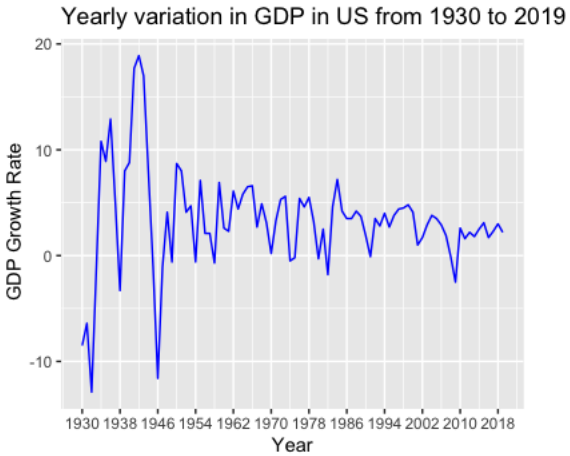
Numerical and graphical summaries to be presented:

1) Scatterplot for Unemployment Rate and GDP Growth Rate

2) Scatterplot for Inflation and GDP Growth Rate

3) Line plot for showing trends in GDP Growth Rate over the years from 1929 to 2019





Models to be fitted:

1) **Primary Objective:**

Linear Model

Model 1: GDP Growth Rate ~ Unemployment Rate

R Output:

```
lm(formula = gdp_growth ~ unemployment_rate)

Residuals:
    Min      1Q  Median      3Q     Max
-15.387  -1.706  -0.231   1.640  15.230

Coefficients:
                  Estimate Std. Error t value Pr(>|t|)
(Intercept)         4.3545     0.9257   4.704 9.41e-06 ***
unemployment_rate  -0.1456     0.1093  -1.332    0.186
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 4.826 on 88 degrees of freedom
  (1 observation deleted due to missingness)
Multiple R-squared:  0.01975,    Adjusted R-squared:  0.008615
F-statistic: 1.773 on 1 and 88 DF,  p-value: 0.1864
```

2) **Secondary Objective:**

Linear Model

Model 2: GDP Growth Rate ~ Inflation

R Output:

```
lm(formula = gdp_growth ~ inflation)

Residuals:
     Min       1Q   Median       3Q      Max
-18.9963  -1.8554  -0.0492   1.5904  13.9778

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   2.4753     0.6376   3.882   0.0002 ***
inflation     0.2719     0.1264   2.152   0.0342 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 4.751 on 88 degrees of freedom
  (1 observation deleted due to missingness)
Multiple R-squared:  0.04998,    Adjusted R-squared:  0.03918
F-statistic: 4.629 on 1 and 88 DF,  p-value: 0.03417
```