Worksheet 9

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Load Libraries

```
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.4     v readr     2.1.5
## v forcats   1.0.0     v stringr   1.5.1
## v ggplot2   3.5.1     v tibble    3.2.1
## v lubridate 1.9.4     v tidyr     1.3.1
## v purrr     1.0.2
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(ggplot2)
# install.packages("plotly")
library(plotly)
```

```
##
## Attaching package: 'plotly'
##
## The following object is masked from 'package:ggplot2':
##
##     last_plot
##
## The following object is masked from 'package:stats':
##
##     filter
##
## The following object is masked from 'package:graphics':
##
##     layout
```

```
# install.packages("GGally")
library(GGally)
```

```
## Registered S3 method overwritten by 'GGally':
##   method from
##   +.gg   ggplot2
```

```r
# install.packages("factoextra")
library(factoextra)
```

```
## Welcome! Want to learn more? See two factoextra-related books at https://goo.gl/ve3WBa
```

```r
library(readxl)
```

Read the Data

```r
USairpollution <- read_excel("~/Desktop/STAT 301/Week 9/USairpollution.xlsx")
USairpollution
```

```
## # A tibble: 41 x 8
##    City           SO2  Temp  Manu Population  Wind Precipitation predays
##    <chr>        <dbl> <dbl> <dbl>      <dbl> <dbl>         <dbl>   <dbl>
##  1 Albany          46  47.6    44        116   8.8          33.4      135
##  2 Albuquereque    11  56.8    46        244   8.9           7.77      58
##  3 Atlanta         24  61.5   368        497   9.1          48.3      115
##  4 Baltimore       47  55     625        905   9.6          41.3      111
##  5 Buffalo         11  47.1   391        463  12.4          36.1      166
##  6 Charleston      31  55.2    35         71   6.5          40.8      148
##  7 Chicago        110  50.6  3344       3369  10.4          34.4      122
##  8 Cincinnati      23  54     462        453   7.1          39.0      132
##  9 Cleveland       65  49.7  1007        751  10.9          35.0      155
## 10 Columbus        26  51.5   266        540   8.6          37.0      134
## # i 31 more rows
```

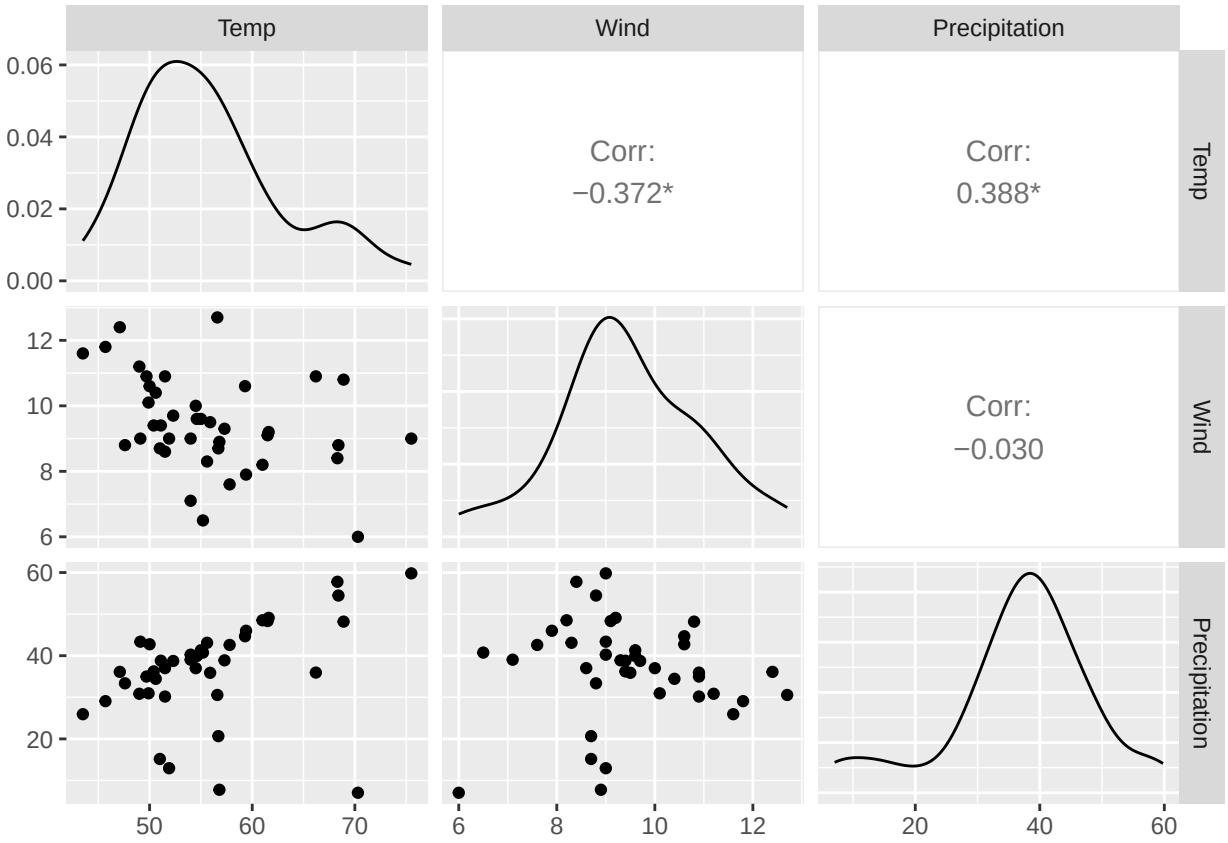
Question 1 Code

```r
plot_ly(data = USairpollution, x = ~Temp, y = ~Wind, z = ~Precipitation)
```

```
## No trace type specified:
##   Based on info supplied, a 'scatter3d' trace seems appropriate.
##   Read more about this trace type -> https://plotly.com/r/reference/#scatter3d

## No scatter3d mode specifed:
##   Setting the mode to markers
##   Read more about this attribute -> https://plotly.com/r/reference/#scatter-mode
```

```r
ggpairs(data = USairpollution, columns = c(3,6,7))
```



Read Additional Data

```
SalmonData <- read_excel("~/Desktop/STAT 301/Week 9/SalmonData.xlsx")
SalmonData
```

```
## # A tibble: 23 x 4
##     YEAR Winter Spring   Fall
##    <dbl>  <dbl>  <dbl>  <dbl>
##  1  1983   1827   6206  74567
##  2  1984   2662   8014  98014
##  3  1989    691   5785  74193
##  4  1990    426   5540  70383
##  5  1991    210   1623  30574
##  6  1993    378    754  48140
##  7  1994   1856   2072 105745
##  8  2004   7869   7380 144494
##  9  2006  17296   8188 148732
## 10  2007   1541   2357  47714
## # i 13 more rows
```

Question 2 Code

```
model2 <- prcomp(~Winter+Spring+Fall, data = SalmonData, scale = TRUE)
result2 <- summary(model2)
result2$center
```

```
##    Winter    Spring      Fall
##  3376.783  3377.522 78942.522
```

```
result2$importance
```

```
##                             PC1       PC2       PC3
## Standard deviation     1.51524 0.7152119 0.4387702
## Proportion of Variance 0.76532 0.1705100 0.0641700
## Cumulative Proportion  0.76532 0.9358300 1.0000000
```

```
result2$rotation
```

```
##              PC1        PC2        PC3
## Winter 0.5338435 -0.8075270 -0.2508213
## Spring 0.5791545  0.5653099 -0.5873711
## Fall   0.6161097  0.1683000  0.7694699
```