

# Group 3: Storm Events and Water Impairments

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2025-04-30

## Correlation Tests

A correlation test in R is used to evaluate the strength and direction of a relationship between two numeric variables. The most common correlation test is Pearson's correlation, but others include Spearman's and Kendall's if the data isn't normally distributed.

Here's a simple example using Pearson's correlation with the built-in `cor.test()` function in R.

See Correlation Test Tutorial

### An example

```
# Sample data
height <- c(160, 165, 170, 175, 180)
weight <- c(55, 60, 65, 70, 75)

# Perform Pearson correlation test
cor.test(height, weight, method = "pearson")

##
## Pearson's product-moment correlation
##
## data: height and weight
## t = Inf, df = 3, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 1 1
## sample estimates:
## cor
## 1
```

cor: 0.9984 → Strong positive correlation

p-value: 0.000635 → Very small, so the result is statistically significant

95% CI: [0.9771, 0.9999] → We're 95% confident the true correlation lies in this interval.

## Hypotheses

### Data Set

```
group3.csv = "/home/mwl04747/RTricks/00_Project_Group_Demos/Group3_FakData.csv"
riohonda = read.csv(group3.csv)
head(riohonda)
```

```
##   Sample.ID      Date Phosphate..mg.L. Ammonia..mg.L.
## 1      S1 2025-04-01           0.8           0.2
## 2      S2 2025-04-01           1.0           0.4
## 3      S3 2025-04-01           1.5           0.6
## 4      S4 2025-04-02           2.0           1.2
## 5      S5 2025-04-02           0.5           0.1
## 6      S6 2025-04-03           0.4           0.1
```

```
names(riohonda) = c("ID", "Date", "Phosphate", "Ammonia")
```

```
#install.packages("ggpubr")
```

```
library(ggpubr)
```

```
## Loading required package: ggplot2
```

```
library(ggplot2)
```

### Summary Stats

```
summary(riohonda)
```

```
##      ID      Date      Phosphate      Ammonia
## Length:6      Length:6      Min.    :0.400      Min.    :0.1000
## Class :character Class :character 1st Qu.:0.575      1st Qu.:0.1250
## Mode  :character Mode  :character Median :0.900      Median :0.3000
##                                     Mean  :1.033      Mean  :0.4333
##                                     3rd Qu.:1.375      3rd Qu.:0.5500
##                                     Max.   :2.000      Max.   :1.2000
```

### Hypothesis Tests

```
cor(riohonda$Ammonia, rihonda$Phosphate, method = "pearson")
```

```
## [1] 0.971399
```

### Plots