**In-Class Assignment 10**

1. Open the pizza dataset.
   1. Calculate the covariance and correlation between moisture and cal using cov and cor

Graphical user interface, application, Word

Description automatically generated

* 1. Verify the cov value by calculating E(XY) – E(X)E(Y) (will not be exact)

Graphical user interface

Description automatically generated with low confidence

* 1. Verify the cor value by diving the covariance by the product of standard deviations

Graphical user interface, application

Description automatically generated

* 1. Examine the entire correlation matrix. Which variable has the strongest correlation with cal?

Text

Description automatically generated

Fat is strongly correlated with cal

1. For a multivariate normal definition, define the mean value to be (1, 2), with Var(X) = 2, Var(Y) = 1, and the Corr(X, Y) = -0.5.
   1. Create a contour plot for this distribution.

co\_df <- data.frame('x' = x, 'y' = y)

ggplot(co\_df, aes(x = x, y = y, z = z)) + geom\_contour()

df.grad <- expand.grid(x = seq(-4,4, by = 0.1),y = seq(-4,4, by = 0.1))

dens <- cbind(df.grad, z = dmvnorm(df.grad,c(0,0), Sigma))

ggplot(dens, aes(x = x, y = y, z = z)) + geom\_contour\_filled()

* 1. Create 1,000 simulations of the distribution and create a scatterplot for those simulations.

plot(mvrnorm(1000, mu = c(1,2), Sigma))

Chart, scatter chart

Description automatically generated