GK-12 Lesson Plan

Teacher: Steven MacDonald
Period: Class: Lawrence High School Statistics Class
Date(s): 10/24/2013

SETTING THE STAGE	
Essential Question	How can R be used to plot the results of the different simulations we have been performing?
Content Objective(s) (Student-friendly)	Simulate a homework assignment chosen by Mr. MacDonald in R, use the data to create different plots.
Connection to previous or future lessons	Students learn to apply their new programming skills to solve problems in the format they're used to seeing.
Critical Thinking Questions	Is there only one approach to solving a particular programming problem?
Key Vocabulary	Variable, Matrix, mean, standard deviation, scatter plot, bar plot, histogram.
Materials Needed/Safety	Computer, R Studio
ACTIVE INSTRUCTION	
Launch (Engage)	An extension of previous lessons, with several new tools introduced.
Investigation (Explore)	Students explore the creation and plotting of datasets using two different methods.
TIME FOR REFLECTION	
Summarization (Explain & Extend)	Students perform two tasks: First, they use the dice simulation from previous exercises to create a histogram of the results. Second, they manually input a dataset from their textbook in order to create several plots.
Homework	None

```
#Set up graphical Device to display up to 4 graphs
par(mfrow=c(2,2))
#Read CSV file into vector "data"
data <- as.vector(read.csv("car_data.csv", header=FALSE))
#Extract raw data from the vector, removing lables
data <- data$V1
#Create histogram
hist(data, right=FALSE, col = "Green")
#length(data) returns the number of separate data points in the vector
n <- length(data)
#Formulae for mean, variance, and SD are created, executed, and stored as variables
datamean <- 1/n*sum(data)
datavar <- sum((data-datamean)^2)/n
datasd <-sqrt(datavar)
#Abline creates vertical lines at the mean and first standard deviation
abline(v=datamean, col="Blue")
#abline(v=(datamean + datasd), col="RED")
#abline(v=(datamean - datasd), col="RED")
plot(density(data), xlim=c(60,160))
abline(v=datamean, col="Blue")
abline(v=(datamean + datasd), col="RED")
abline(v=(datamean - datasd), col="RED")
abline(v=(datamean + 2*datasd), col="Green")
abline(v=(datamean - 2*datasd), col="Green")
#Part F starts here; code is repeated after 10 is added to each datapoint.
data <- data+10
hist(data, right=FALSE, col = "Green")
datamean <- 1/n*sum(data)
datavar <- sum((data-datamean)^2)/n
datasd <-sqrt(datavar)
quantile(data)
abline(v=datamean, col="Blue")
#abline(v=(datamean + datasd), col="RED")
#abline(v=(datamean - datasd), col="RED")
plot(density(data), xlim=c(70,170))
abline(v=datamean, col="Blue")
abline(v=(datamean + datasd), col="RED")
abline(v=(datamean - datasd), col="RED")
abline(v=(datamean + 2*datasd), col="Green")
abline(v=(datamean - 2*datasd), col="Green")
```