lab9_stat123

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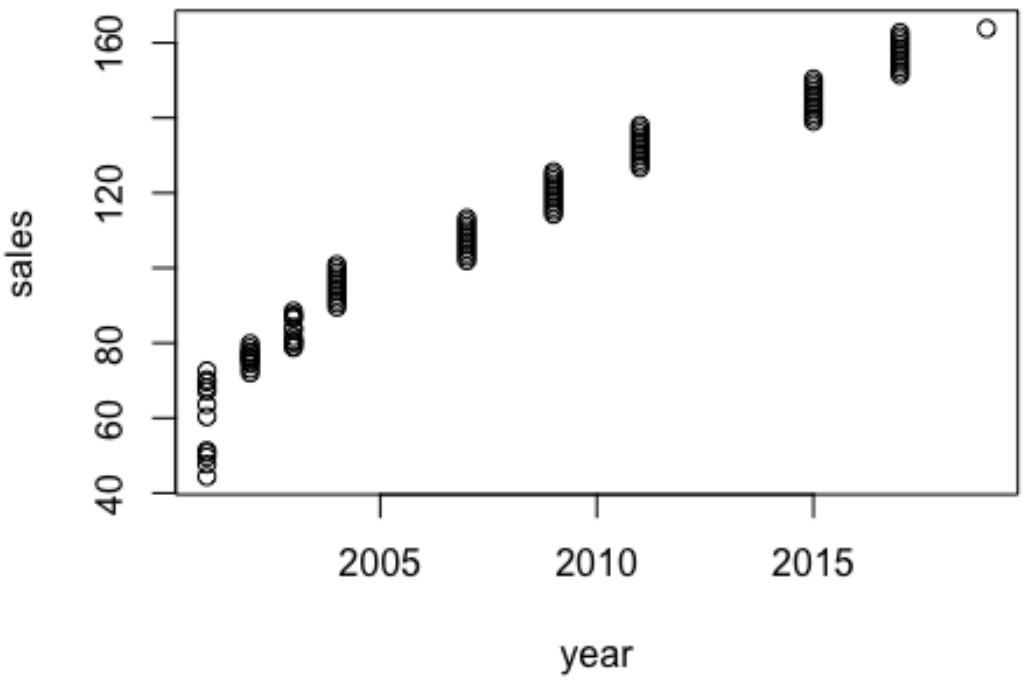
#1. Load the sales.csv dataset into R and save it to df.

```
df<-read.csv("/Users/itagakikouki/stat123/lab9/sales.csv")
head(df)
```

```
##   id year month    sales
## 1  1 2001     1 44.39524
## 2  2 2001     2 47.69823
## 3  3 2001     3 49.58708
## 4  4 2001     4 50.70508
## 5  5 2001     5 51.29288
## 6  6 2001     6 67.15065
```

```
year<-df$year
sales<-df$sales
month<-df$month
#(a) Define the relationship between month and sales in df. Please identify
direction, form, and strength of the relationship.
plot(year, sales)
```




```
cor(year,sales)
```

```
## [1] 0.9739005
```

```
#direction is increasing,the form is linear
#and this is strong trelationship.
```

```
#(b) Perform a linear regression sales (y) and year (x1) and month(x2).
model<-lm(sales~year+month)
```

```
#(c) Predict the sales in March 2010.
#we know exp_y = -1141 + 5.599*year + 1.155*month
y = -11141.030 + 5.599*2010 + 1.155*3
coef = as.matrix(round(model$coefficients,3))
coef
```

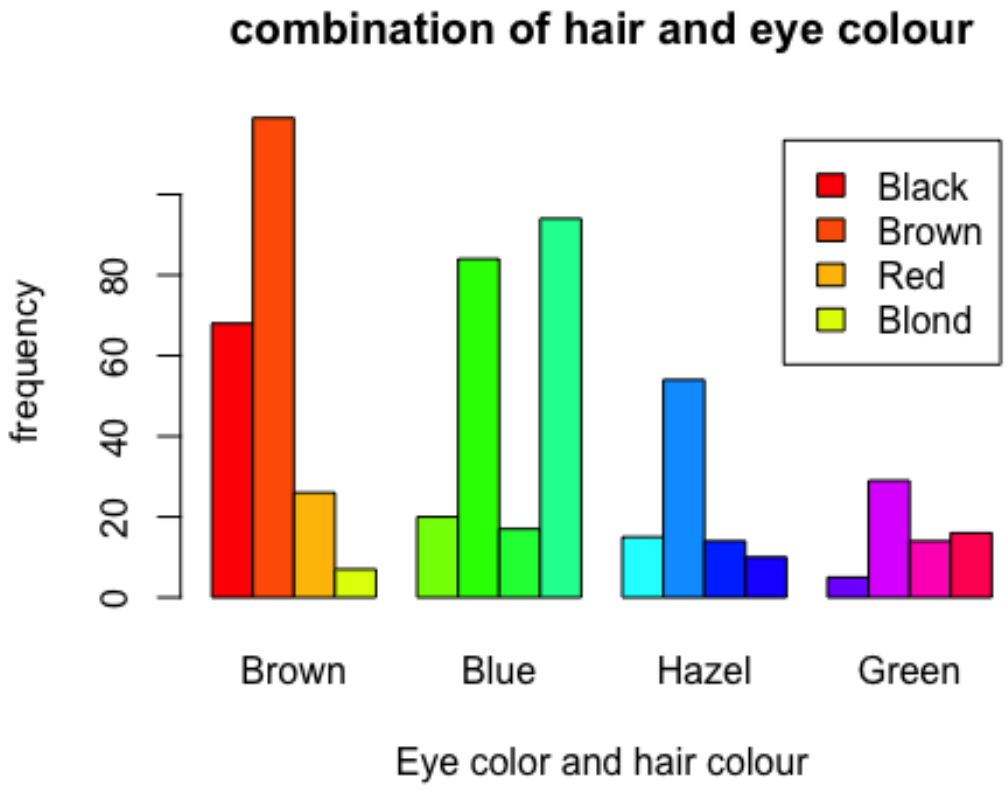
```
##                   [,1]
## (Intercept) -11141.030
```

```
## year              5.599
## month             1.155

y = coef[1] + coef[2]*2010 + coef[3]*3
cat(y,"is an expected value")

## 116.425 is an expected value
```

#2. Use the built-in data set HairEyeColor to answer this question.

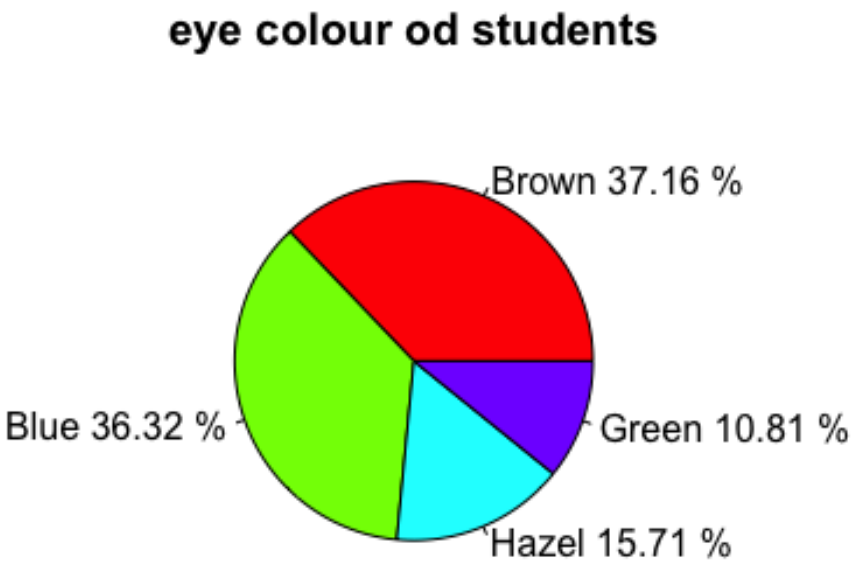
```
#(a) Create a single table called hair_eye_totals which summarizes the total
number of statistics students with each combination of hair and eye colour.
Note: The built-in data set consists of two tables with this information (one
for women and one for men). The answer to part (a) is a single table
combining the information from these two tables.
data("HairEyeColor")
HairEyeColor

## , , Sex = Male
##
##        Eye
## Hair    Brown Blue Hazel Green
##   Black    32   11    10     3
##   Brown    53   50    25    15
##   Red      10   10     7     7
##   Blond     3   30     5     8
##
## , , Sex = Female
##
##        Eye
## Hair    Brown Blue Hazel Green
##   Black    36    9     5     2
##   Brown    66   34    29    14
##   Red      16    7     7     7
##   Blond     4   64     5     8

dim(HairEyeColor)

## [1] 4 4 2

#male female tgt
hair_eye_totals = HairEyeColor[,,1] + HairEyeColor[,,2]

#(b) Print out the hair_eye_totals table.
print(hair_eye_totals)

##        Eye
## Hair    Brown Blue Hazel Green
##   Black    68   20    15     5
##   Brown   119   84    54    29
##   Red      26   17    14    14
##   Blond     7   94    10    16
```

```r
#(c) Create a grouped bar plot which displays the information from the hair_eye_totals table. Your plot should include the following: - a main title - titles for the x-axis and y-axis - colours to help differentiate the bars - a legend to identify what each colour represents
#xaxis is eye color
barplot(hair_eye_totals,main = "combination of hair and eye colour",xlab = "Eye color and hair colour",ylab ="frequency" ,col = rainbow(length(hair_eye_totals)),legend = rownames(hair_eye_totals),beside = T)
```




```r
#(d) Create and print out a vector called percent_eye which contains the percent of statistics students with each eye colour (rounded to 2 decimal places). Show any additional code needed to create this vector.
eyetotal = colSums(hair_eye_totals)

percent_eye =round(eyetotal/sum(eyetotal)*100,2)
eye_label<- paste(names(percent_eye),percent_eye,"%")


#(e) Create a pie chart displaying the information in the percent_eye vector. Your graph should include:- a main title- labels for each wedge displaying the eye colour- a different colour for each eye colour - the percentages displaying next to each wedge.
```

```
  pie(percent_eye, main = "eye colour od students", labels = eye_label,col =
rainbow(length(percent_eye)))
```



3. Use the mtcars data set in R to answer this question.

```
data(mtcars)
dim(mtcars)

## [1] 32 11

head(mtcars)

##                    mpg cyl disp  hp drat    wt  qsec vs am gear carb
## Mazda RX4         21.0   6  160 110 3.90 2.620 16.46  0  1    4    4
## Mazda RX4 Wag     21.0   6  160 110 3.90 2.875 17.02  0  1    4    4
## Datsun 710        22.8   4  108  93 3.85 2.320 18.61  1  1    4    1
## Hornet 4 Drive    21.4   6  258 110 3.08 3.215 19.44  1  0    3    1
## Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02  0  0    3    2
## Valiant           18.1   6  225 105 2.76 3.460 20.22  1  0    3    1

#(a) Create a multi regression model for predicting miles per gallon (mpg)
using weight (wt) and horsepower (hp).
model<-lm(mpg~wt + hp, data = mtcars)
summary(model)
```

```
##
## Call:
## lm(formula = mpg ~ wt + hp, data = mtcars)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -3.941 -1.600 -0.182  1.050  5.854
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 37.22727    1.59879  23.285  < 2e-16 ***
## wt          -3.87783    0.63273  -6.129 1.12e-06 ***
## hp          -0.03177    0.00903  -3.519  0.00145 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.593 on 29 degrees of freedom
## Multiple R-squared:  0.8268, Adjusted R-squared:  0.8148
## F-statistic: 69.21 on 2 and 29 DF,  p-value: 9.109e-12
```

```
#(b) What is the interpretation of the coefficient estimates for the linear regression model part(a), which predicted miles per gallon (mpg) using weight (wt) and horsepower (hp) as predictor variables
```

```
"The intercept coefficient of 37.22727 represents the predicted mpg when both wt and hp are zero. Which is not meaningful scenario but is included in the model for completeness."
```

```
## [1] "The intercept coefficient of 37.22727 represents the predicted mpg when both wt and hp are zero. Which is not meaningful scenario but is included in the model for completeness."
```

```
#The wt coefficient indicates that for every one-unit increase in wt.
#The predicted mpg decreases by approximately 3.92. holding hp constant.

#The hp coefficient -0.03177 of indicates that for every one-unit increases in hp, the predicted mpg decreases by approximately 0.02, holding wt constant.
```