Exploring Relationship between Variables - Quiz

Questions

Question 1

What does the R command *str()* do?

a. It generates a string of random numbers
b. It strips any existing labels from a plot in R
c. It provides information on the structure of an R object
d. It stretches the y-axis on a graph to fit the data displayed

Question 2

How can you explore relationships between two numerical variables?
(Note: Choose as many answers as you need)

a. Correlation coefficent
b. Scatter plot
c. Box plot
d. Shapiro Wilk test

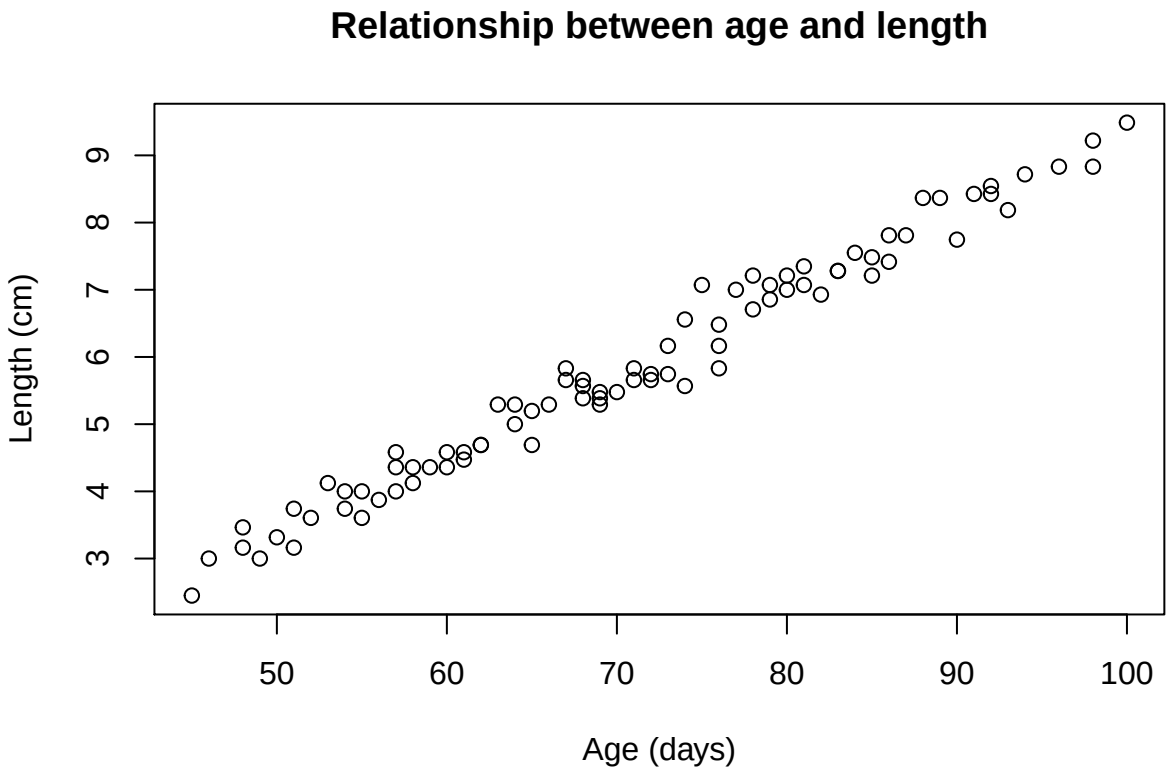
Question 3

What is the difference between the *cor()* and *cor.test()* commands in R?

ANSWER:

Question 4

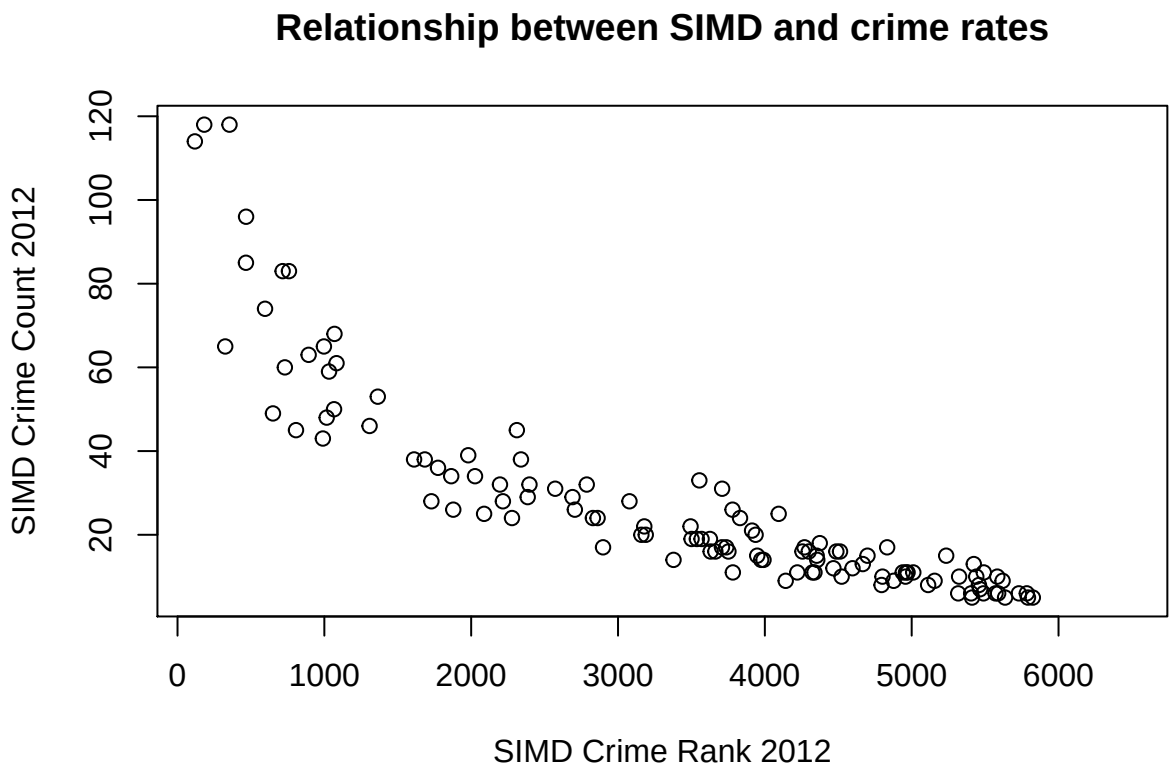
Describe the relationship between the two variable in the following plot:



ANSWER:

Question 5

Describe the relationship between the two variable in the following plot:



ANSWER:

Question 6

Below is the R output for a correlation between precipitation (mm) and cucumber yield (kg/m2). Interpret the correlation coefficient.

```
## [1] 0.8708738
```

ANSWER:

Question 7

Below is the R output for a correlation between the weight and pulse rate of patients. Interpret the correlation coefficient.

```
## [1] -0.2029782
```

ANSWER:

Question 8

You have collected some data on cinema ticket sales and car accidents. You run a correlation in R and your correlation coefficient is 0.95. You conclude that watching movies causes car accidents. Is this a correct interpretation of a correlation coefficient? Please also provide a brief explanation for your chosen answer.

- Yes
- No

EXPLANATION:

Question 9

After running a correlation in R, you found that there is no linear relationship between the two numerical variables. Should you go ahead and perform a linear regression? Please also provide a brief explanation for your chosen answer.

- Yes
- No

EXPLANATION:

Question 10

What is the code to compute a linear regression in R?
(Note: You may assume that the data set has been attached.)

a. *reg(dependent_variable ~ independent_variable)*
b. *lm(dependent_variable ~ independent_variable)*
c. *linear.reg(dependent_variable ~ independent_variable)*
d. *l.regression(dependent_variable ~ independent_variable)*

Question 11

Interpret the intercept and coefficient of the following R output from a linear regression of the healing time (in days) of a wound in terms of the wound dimension (in mm):

```
##
## Call:
## lm(formula = wound$time ~ wound$dim)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -14.340  -6.941  -1.724   6.159  18.416
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   7.0837     5.5046   1.287    0.207
## wound$dim     0.7063     0.0705  10.017 1.12e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 9.059 on 34 degrees of freedom
## Multiple R-squared:  0.7469, Adjusted R-squared:  0.7395
## F-statistic: 100.3 on 1 and 34 DF,  p-value: 1.116e-11
```

ANSWER:

Question 12

Interpret the intercept and coefficient of the following R output from a linear regression of the length of a foetus (in cm) in terms of age (in days):

```
##
## Call:
## lm(formula = foetus$length ~ foetus$age)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.65506 -0.18972  0.01104  0.15364  0.72780
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -2.690881   0.148621  -18.11   <2e-16 ***
## foetus$age   0.120455   0.002055   58.62   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2655 on 82 degrees of freedom
## Multiple R-squared:  0.9767, Adjusted R-squared:  0.9764
## F-statistic:  3436 on 1 and 82 DF,  p-value: < 2.2e-16
```

ANSWER:

Question 13

Interpret the intercept and coefficient of the following R output from a linear regression of the SIMD crime count in terms of the SIMD crime rank:

```
##
## Call:
## lm(formula = crimes$SIMD.Crime.2012.count ~ crimes$SIMD.Crime.2012.rank)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -20.79  -7.75  -0.33   5.51  51.82
##
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)
## (Intercept)                  70.6854678  2.5285067   27.95   <2e-16 ***
## crimes$SIMD.Crime.2012.rank -0.0127240  0.0006698  -19.00   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 12.1 on 117 degrees of freedom
##   (23 observations deleted due to missingness)
## Multiple R-squared:  0.7552, Adjusted R-squared:  0.7531
## F-statistic: 360.9 on 1 and 117 DF,  p-value: < 2.2e-16
```

ANSWER:

Question 14

Why does it make sense to use *summary(lm())* rather than just *lm()* when running a linear regression in R?

ANSWER:

Question 15

Amend the following R code to make predictions not only for 100 but also for 200 and 500 without adding an additional line of code:

predict(lm(dependent_variable~independent_variable), newdata=data.frame(independent_variable=100), interval="pred")

ANSWER:

Question 16

Interpret the following predictions of exam scores (in %) for the average amount of sleep for 7 and 9.5 hours respectively:

```
##        fit      lwr      upr
## 1 51.34277 36.83852 65.84701
## 2 69.66099 55.09294 84.22905
```

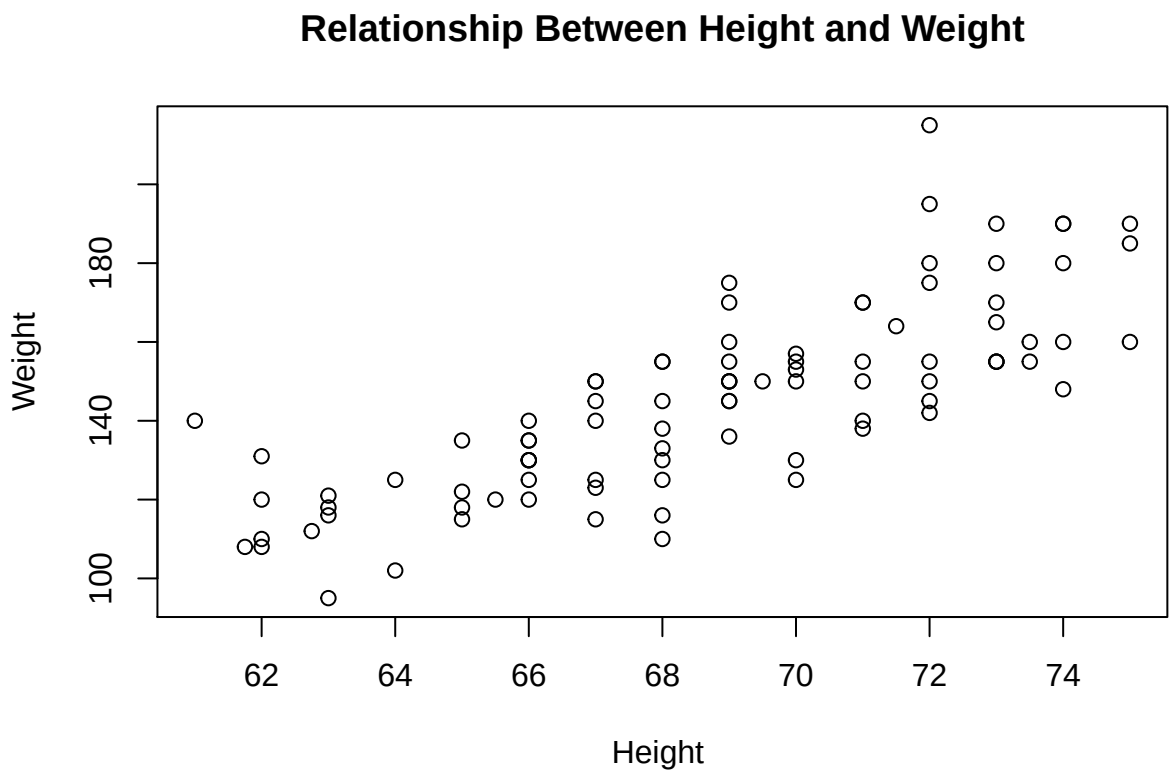
ANSWER:

Question 17

What R code can be used to add a regression line (in the colour red) to the following plot:

```r
activity <- read.table(file.choose(), header = TRUE, sep = ",")

plot(activity$Height, activity$Weight, main = "Relationship Between Height and Weight",
    xlab = "Height ", ylab = "Weight")
```



ANSWER:

Question 18

Interpret the coefficent of determination below for a regression of the lenth of a foetus in terms of age:

```
## [1] 0.976694
```

ANSWER: