Quiz 1

Help

Warning: The hard deadline has passed. You can attempt it, but **you will not get credit for it**. You are welcome to try it as a learning exercise.

- [ ] **In accordance with the Coursera Honor Code, I (Dan Nuttle) certify that the answers here are my own work.**

Question 1

Consider the data set given below

```
x <- c(0.18, -1.54, 0.42, 0.95)
```

And weights given by

```
w <- c(2, 1, 3, 1)
```

Give the value of μ that minimizes the least squares equation $\sum_{i=1}^{n} w_i (x_i - \mu)^2$

- 1.077
- 0.1471
- 0.300
- 0.0025

Question 2

Consider the following data set

```
x <- c(0.8, 0.47, 0.51, 0.73, 0.36, 0.58, 0.57, 0.85, 0.44, 0.42)
y <- c(1.39, 0.72, 1.55, 0.48, 1.19, -1.59, 1.23, -0.65, 1.49, 0.05)
```

Fit the regression through the origin and get the slope treating y as the outcome and x as the regressor. (Hint, do not center the data since we want regression through the origin, not through the means of the data.)

- 0.59915
- -1.713
- 0.8263
- -0.04462

Question 3

Do `data(mtcars)` from the datasets package and fit the regression model with mpg as the outcome and weight as the predictor. Give the slope coefficient.

- -5.344
- 30.2851
- 0.5591
- -9.559

Question 4

Consider data with an outcome (Y) and a predictor (X). The standard deviation of the predictor is one half that of the outcome. The correlation between the two variables is .5. What value would the slope coefficient for the regression model with Y as the outcome and X as the predictor?

- 4
- 1
- 3
- 0.25

Question 5

Students were given two hard tests and scores were normalized to have empirical mean 0 and variance 1. The correlation between the scores on the two tests was 0.4. What would be the expected score on Quiz 2 for a student who had a normalized score of 1.5 on Quiz 1?

- 0.6
- 0.4
- 1.0
- 0.16

Question 6

Consider the data given by the following

```
x <- c(8.58, 10.46, 9.01, 9.64, 8.86)
```

What is the value of the first measurement if x were normalized (to have mean 0 and variance 1)?

- 8.86
- 9.31
- 8.58
- -0.9719

Question 7

Consider the following data set (used above as well). What is the intercept for fitting the model with x as the predictor and y as the outcome?

```
x <- c(0.8, 0.47, 0.51, 0.73, 0.36, 0.58, 0.57, 0.85, 0.44, 0.42)
y <- c(1.39, 0.72, 1.55, 0.48, 1.19, -1.59, 1.23, -0.65, 1.49, 0.05)
```

- -1.713
- 1.567
- 1.252
- 2.105

Question 8

You know that both the predictor and response have mean 0. What can be said about the intercept when you fit a linear regression?

- It is undefined as you have to divide by zero.
- Nothing about the intercept can be said from the information given.
- It must be exactly one.
- It must be identically 0.

Question 9

Consider the data given by

```
x <- c(0.8, 0.47, 0.51, 0.73, 0.36, 0.58, 0.57, 0.85, 0.44, 0.42)
```

What value minimizes the sum of the squared distances between these points and itself?

- 0.573
- 0.8
- 0.36
- 0.44

Question 10

Consider taking the slope having fit Y as the outcome and X as the predictor, β_1 and the slope from fitting X as the outcome and Y as the predictor, γ_1, and dividing the two as

β_1/γ_1. What is this ratio always equal to?

- $Var(Y)/Var(X)$
- $Cor(Y, X)$
- $2SD(Y)/SD(X)$
- 1

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