

## Assessment: Stratification and Variance Explained, Part 2

In the second part of this assessment, you'll analyze a set of mother and daughter heights, also from **GaltonFamilies**.

Define **female\_heights**, a set of mother and daughter heights sampled from **GaltonFamilies**, as follows:

```
set.seed(1989) #if you are using R 3.5 or earlier
set.seed(1989, sample.kind="Rounding") #if you are using R 3.6 or later
library(HistData)
data("GaltonFamilies")

female_heights <- GaltonFamilies%>%
  filter(gender == "female") %>%
  group_by(family) %>%
  sample_n(1) %>%
  ungroup() %>%
  select(mother, childHeight) %>%
  rename(daughter = childHeight)
```

### Question 8

5.0/5.0 points (graded)

Calculate the mean and standard deviation of mothers' heights, the mean and standard deviation of daughters' heights, and the correlaton coefficient between mother and daughter heights.

Mean of mothers' heights

✓ Answer: 64.1

### Explanation

This can be calculated using the following code: `mean(female_heights$mother)`.

Standard deviation of mothers' heights

2.289292

✓ Answer: 2.29

2.289292

### Explanation

This can be calculated using the following code: `sd(female_heights$mother)`.

Mean of daughters' heights

64.28011

✓ Answer: 64.3

64.28011

### Explanation

This can be calculated using the following code: `mean(female_heights$daughter)`.

Standard deviation of daughters' heights

2.39416

✓ Answer: 2.39

2.39416

### Explanation

This can be calculated using the following code: `sd(female_heights$daughter)`.

Correlation coefficient

0.3245199

✓ Answer: 0.325

0.3245199

### Explanation

This can be calculated using the following code:

```
cor(female_heights$mother, female_heights$daughter)
```

Submit

You have used 1 of 10 attempts

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**i** Answers are displayed within the problem

3.0/3.0 points (graded)

Calculate the slope and intercept of the regression line predicting daughters' heights given mothers' heights. Given an increase in mother's height by 1 inch, how many inches is the daughter's height expected to change?

Slope of regression line predicting daughters' height from mothers' heights

✓ Answer: 0.339

### Explanation

This can be calculated using the following code:

```
r <- cor(female_heights$mother, female_heights$daughter)
s_y <- sd(female_heights$daughter)
s_x <- sd(female_heights$mother)
r * s_y/s_x
```

Intercept of regression line predicting daughters' height from mothers' heights

✓ Answer: 42.5

### Explanation

This can be calculated using the following code:

```
mu_y <- mean(female_heights$daughter)
mu_x <- mean(female_heights$mother)
mu_y - (r * s_y/s_x)*mu_x
```

Change in daughter's height in inches given a 1 inch increase in the mother's height

✓ Answer: 0.339

### Explanation

This can be calculated using the following code: `r * s_y/s_x`.

You have used 1 of 10 attempts

## Question 10

1.0/1.0 point (graded)

What percent of the variability in daughter heights is explained by the mother's height?

Report your answer as a number between 0 and 100.

✓ Answer: 10.5

### Explanation

The percent variability can be calculated using  $r^2 * 100$ .

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**i** Answers are displayed within the problem

## Question 11

1.0/1.0 point (graded)

A mother has a height of 60 inches.

What is the conditional expected value of her daughter's height given the mother's height?

✓ Answer: 62.9

### Explanation

The expected height can be calculated using the following code:

```
m = r * s_y/s_x
b = mu_y - (r * s_y/s_x)*mu_x
x = 60
m*x+b
```

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You have used 1 of 10 attempts

**i** Answers are displayed within the problem