quiz 4

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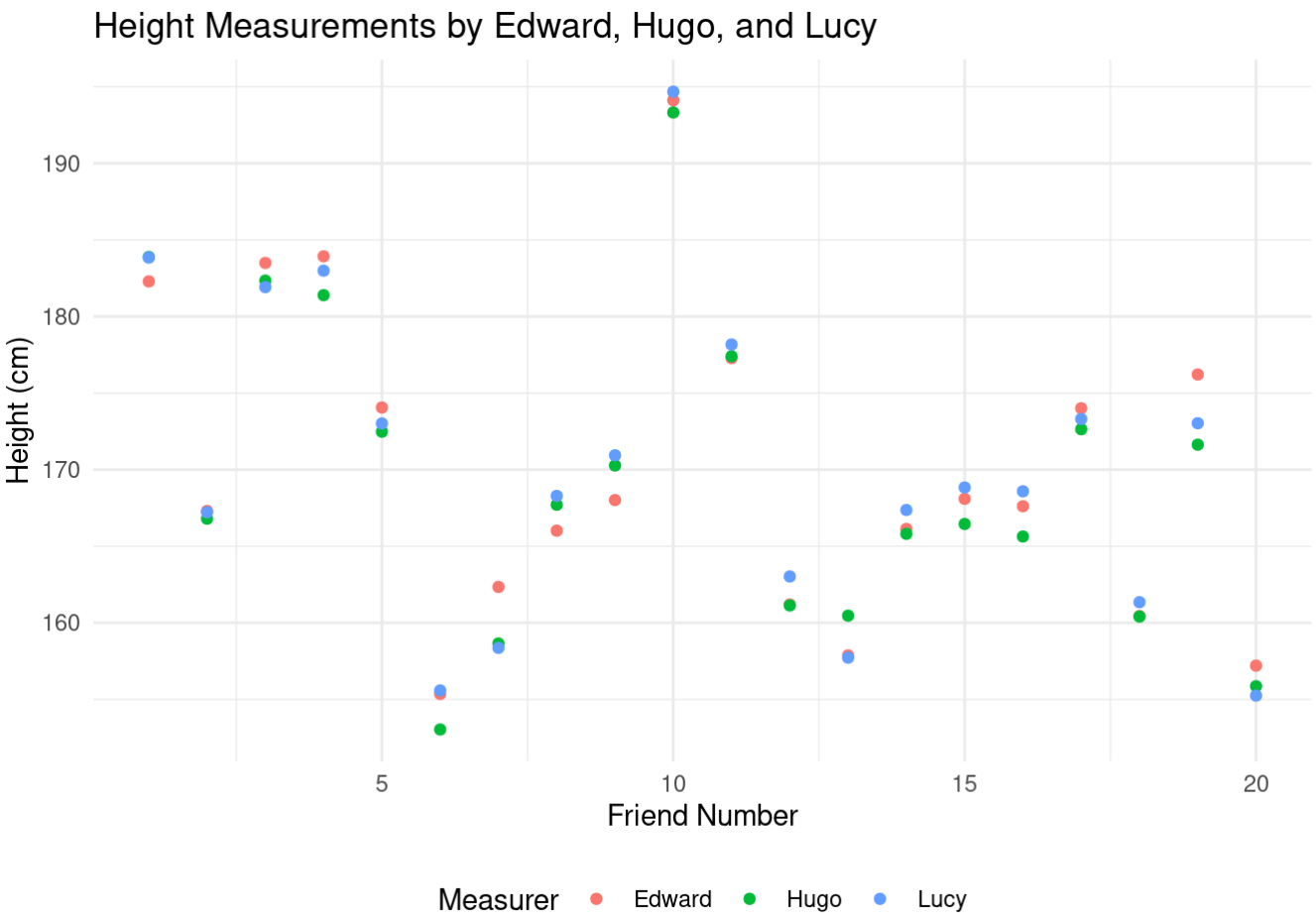
```
set.seed(0)

n_friends <- 20

true_heights <- rnorm(n_friends, mean = 170, sd = 10)

edward_errors <- rnorm(n_friends, mean = 0, sd = 1.5)
hugo_errors <- rnorm(n_friends, mean = -0.5, sd = 1)
lucy_errors <- rnorm(n_friends, mean = 0.5, sd = 2)

edward_measurements <- true_heights + edward_errors
hugo_measurements <- true_heights + hugo_errors
lucy_measurements <- true_heights + lucy_errors

measurements_df <- data.frame(
  Edward = edward_measurements,
  Hugo = hugo_measurements,
  Lucy = lucy_measurements
)

ttest_edward_hugo <- t.test(measurements_df$Edward, measurements_df$Hugo)

ttest_hugo_lucy <- t.test(measurements_df$Hugo, measurements_df$Lucy)

corr_edward_lucy <- cor.test(measurements_df$Edward, measurements_df$Lucy)

list(ttest_edward_hugo, ttest_hugo_lucy, corr_edward_lucy)
```

```
[[1]]

    Welch Two Sample t-test

data:  measurements_df$Edward and measurements_df$Hugo
t = 0.23954, df = 38, p-value = 0.812
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -5.834955  7.401107
sample estimates:
mean of x mean of y
 170.1497  169.3666


[[2]]

    Welch Two Sample t-test

data:  measurements_df$Hugo and measurements_df$Lucy
t = -0.24631, df = 37.996, p-value = 0.8068
```

```
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -7.44781  5.83204
sample estimates:
mean of x mean of y
 169.3666  170.1745


[[3]]

    Pearson's product-moment correlation

data:  measurements_df$Edward and measurements_df$Lucy
t = 24.711, df = 18, p-value = 2.431e-15
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.9631084 0.9944023
sample estimates:
      cor
0.9855796
```

```r
library(ggplot2)

set.seed(0)

n_friends <- 20

true_heights <- rnorm(n_friends, mean = 170, sd = 10)

edward_errors <- rnorm(n_friends, mean = 0, sd = 1.5)
hugo_errors <- rnorm(n_friends, mean = -0.5, sd = 1)
lucy_errors <- rnorm(n_friends, mean = 0.5, sd = 2)

edward_measurements <- true_heights + edward_errors
hugo_measurements <- true_heights + hugo_errors
lucy_measurements <- true_heights + lucy_errors

measurements_df <- data.frame(
  Friend = rep(1:n_friends, 3),
  Height = c(edward_measurements, hugo_measurements, lucy_measurements),
  Measurer = factor(rep(c('Edward', 'Hugo', 'Lucy'), each = n_friends))
)

ggplot(measurements_df, aes(x = Friend, y = Height, color = Measurer)) +
  geom_point() +
  theme_minimal() +
  labs(title = 'Height Measurements by Edward, Hugo, and Lucy',
       x = 'Friend Number',
       y = 'Height (cm)',
       color = 'Measurer') +
  theme(legend.position = "bottom")
```


Height Measurements by Edward, Hugo, and Lucy
Height (cm)
190
180
170
160
5
10
15
20
Friend Number
Measurer
Edward
Hugo
Lucy