

# Homework 3

## DATA 202 - Alexander - Fall 2023

Please submit **Homework 3** responses as a .pdf file on Canvas [here](#).

### Exercise 1.1

Is the relationship between the  $x$  and  $y$  variables in the below model significant?

If so, explain. If not, explain why.

```
model <- lm(y ~ x)
summary(model)
```

Call:

```
lm(formula = y ~ x)
```

Residuals:

Min	1Q	Median	3Q	Max
-2.19086	-0.70179	-0.07264	0.79898	2.37303

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	9.1441	0.1231	74.28	<2e-16 ***
x	-5.9740	0.1277	-46.77	<2e-16 ***

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.062 on 73 degrees of freedom

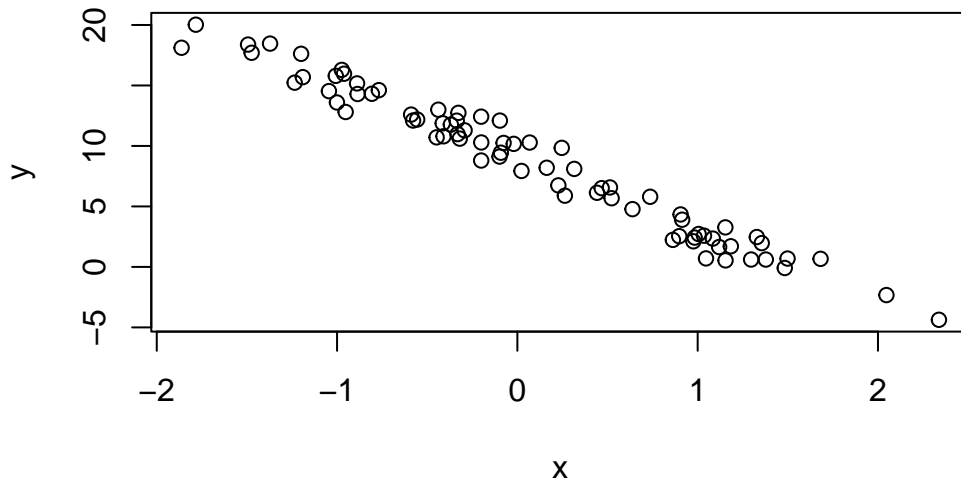
Multiple R-squared: 0.9677, Adjusted R-squared: 0.9673

F-statistic: 2187 on 1 and 73 DF, p-value: < 2.2e-16

### Exercise 1.2

Examine the plot below. Estimate the correlation coefficient for the plot.

```
plot(x, y)
```

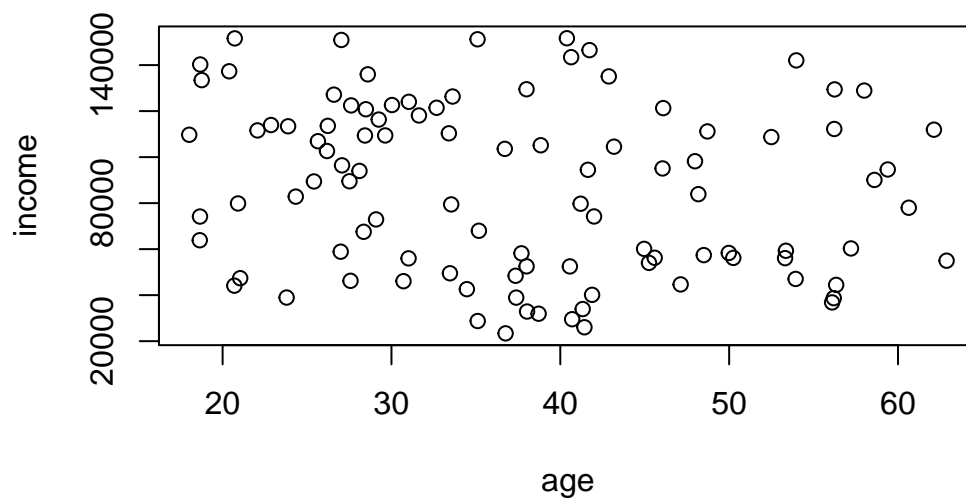


### Exercise 1.3

Examine the plot below. Estimate the correlation coefficient for the plot.

Based on your estimate, should we move forward with our analysis? If so, why? If no, why not?

```
plot(age, income)
```



## Exercise 1.4

In a few sentences, summarize the relationship between the variables based on the output.

Is there a significant relationship?

```
model2 <- lm(funding ~ capacity)
summary(model2)
```

Call:

```
lm(formula = funding ~ capacity)
```

Residuals:

Min	1Q	Median	3Q	Max
-28999	-12361	1602	10632	35789

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	238752.68	124897.76	1.912	0.0589 .
capacity	-19.92	16.64	-1.197	0.2342

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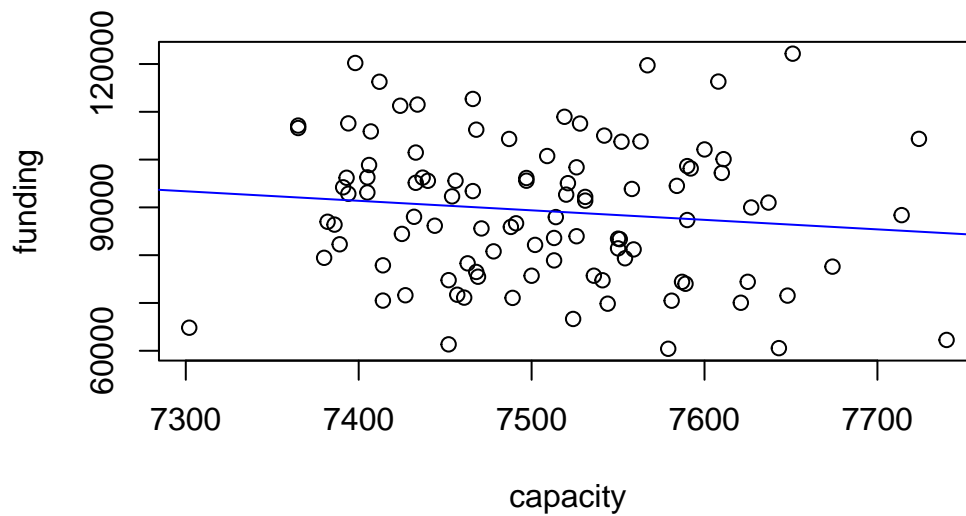
Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 14590 on 98 degrees of freedom

Multiple R-squared: 0.01441, Adjusted R-squared: 0.004349

F-statistic: 1.432 on 1 and 98 DF, p-value: 0.2342

```
plot(capacity, funding)
abline(model2, col="blue")
```



### Exercise 1.5

Using the model outlined above and the plot shown below, explain the function of a residual plot.

Does the residual plot represent a “healthy” or “problematic” pattern?

```
resids2 <- residuals(model2)  
plot(funding, resids2)
```

