# Homework8

Daniel Wu (EID: djw3627)

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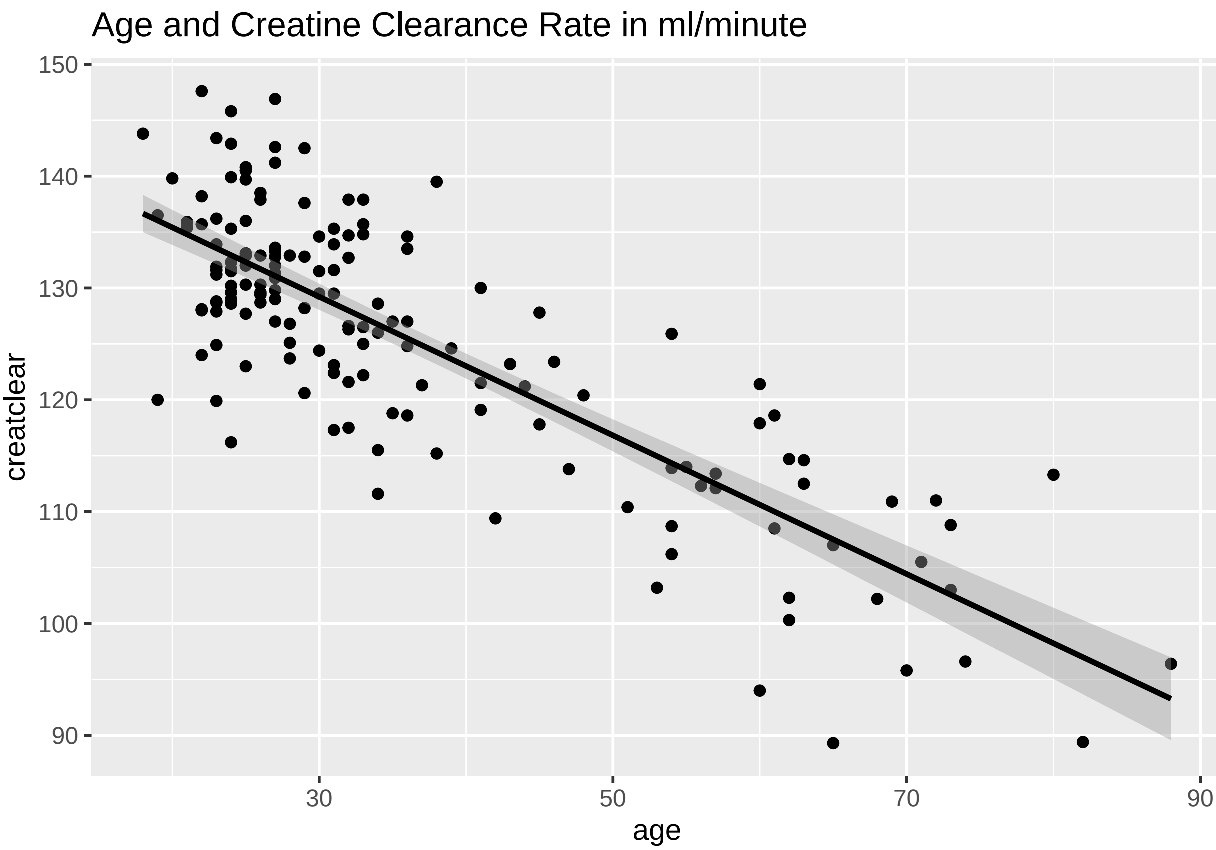
To access my GitHub repository, click here: https://github.com/DanielWu3627/SDS315. Please check the file named **Homework8.Rmd**.

## Problem 1




```
## (Intercept)         age
##      147.81       -0.62
```

### Part A

For a 55-year-old, we expect the creatinine clearance should be about 113.71 ml/minute. I determined this by first running a regression analysis of creatinine clearance vs. age and then using the coef() function to get the y-intercept, which is about 147.81, and the slope, which is about -0.62. Therefore, with y = slope * x + y-intercept (y = -0.62x + 147.81) is -0.62 * 55 + 147.81 = 113.71 ml/minute.

### Part B

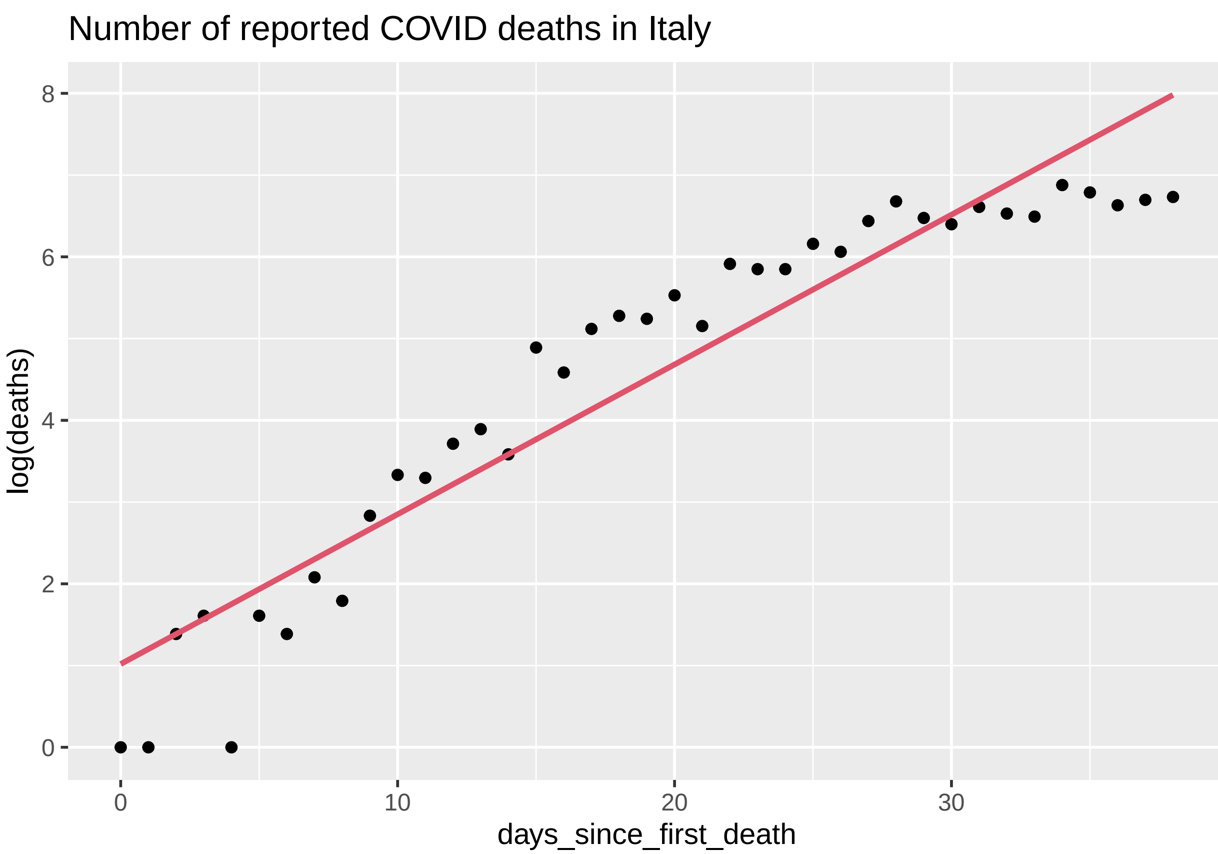
Creatinine clearance decreases by a rate of approximately -0.62 ml/minute per year. I determined this by first running a regression analysis and then using the coef() function to get the slope, which is about -0.62. As age increases by 1, the creatinine clearance should decrease by 0.62 ml/minute.

### Part C

y = -0.62x + 147.81 -> -0.62 * 40 + 147.81 = 123.01 (expected creatine value for a 40-yr-old) y = -0.62x + 147.81 -> -0.62 * 60 + 147.81 = 110.61 (expected creatine value for a 60-yr-old) The expected creatine clearance rate is 123.01 ml/minute for the 40-yr-old. This 40-yr-old has a rate of 135, which is about 11.99 above the expected value. The expected creatine rate for a 60-yr-old is 110.61 ml/minute, but that 60-yr-old's is 112, with a difference of 1.39 above the expected value. Therefore, the creatine clearance rate is healthier for the 40-year old with a rate of 135.

## Problem 2

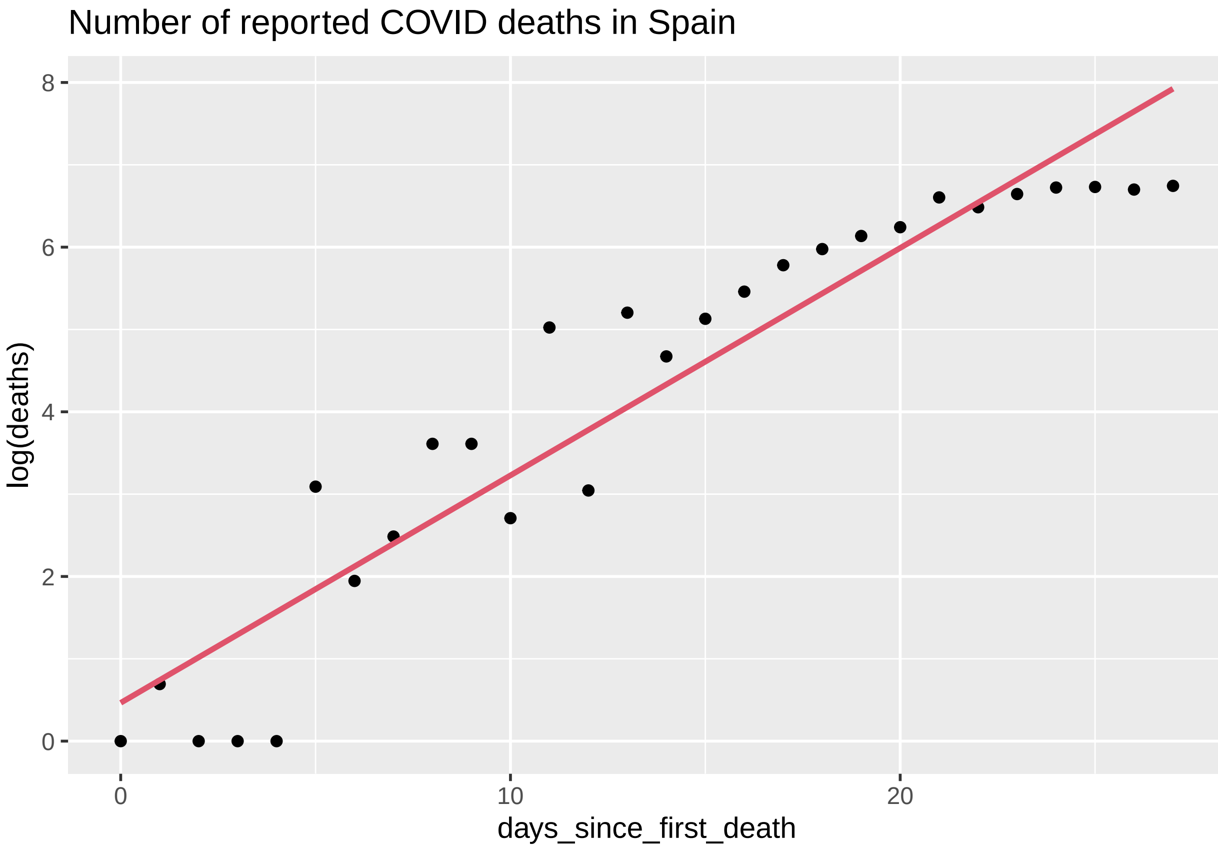
### 1.




```
##                      name       lower       upper level     method    estimate
## 1               Intercept   0.5391942   1.6003642  0.95 percentile   0.6786914
## 2 days_since_first_death   0.1593454   0.2079217  0.95 percentile   0.2082641
## 3                   sigma   0.5508425   0.8360535  0.95 percentile   0.8271387
## 4               r.squared   0.8546581   0.9328625  0.95 percentile   0.8812985
## 5                       F 217.5720775 514.1080635  0.95 percentile 274.7062862
```

```
## [1] "The doubling time for Italy is approximately 3.9"
```

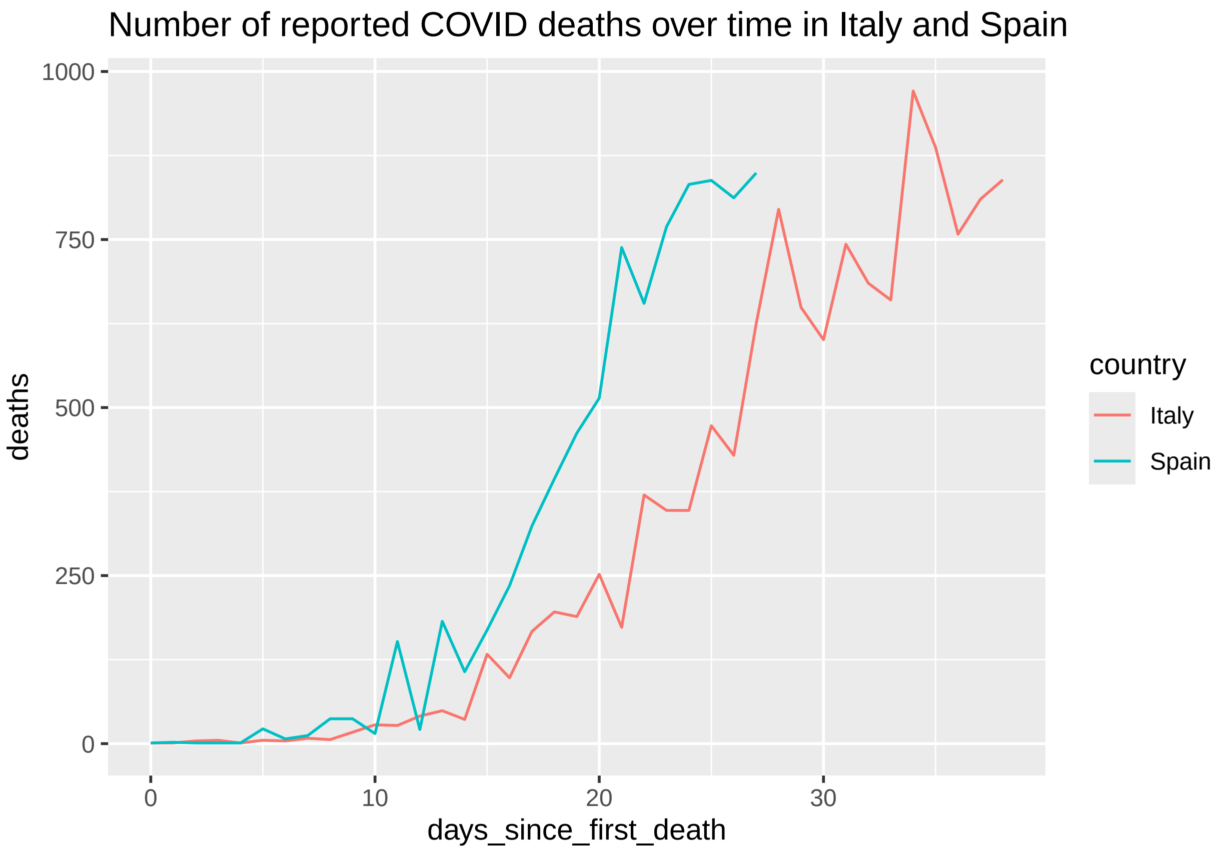
The estimated growth rate for Italy is 0.180, with a 95% confidence interval [0.159, 0.208]. The estimated doubling time for Italy is 3.9 days, with a 95% confidence interval [3.4, 4.4].




```
##                    name       lower       upper level     method    estimate
## 1             Intercept  -0.1516204   1.2470547  0.95 percentile   0.2656199
## 2 days_since_first_death   0.2347834   0.3166407  0.95 percentile   0.2976922
## 3                 sigma   0.5981941   0.9581418  0.95 percentile   0.6876322
## 4             r.squared   0.8292877   0.9390789  0.95 percentile   0.9228520
## 5                     F 126.3030515 400.7818540  0.95 percentile 311.0147789
```

```
## [1] "The doubling time for Spain is 2.3"
```

The estimated growth rate is 0.287, with a 95% confidence interval [0.235, 0.317]. The estimated doubling time for Spain is 2.3 days, with a 95% confidence [2.2, 3].




## Problem 3

```
##          name       lower       upper level     method    estimate
## 1  Intercept   4.5362285   4.8893692  0.95 percentile   4.6933843
## 2 log.price.  -1.7690751  -1.4529753  0.95 percentile  -1.5477914
## 3      sigma   0.2316697   0.3001399  0.95 percentile   0.2578064
## 4  r.squared   0.6864506   0.8440191  0.95 percentile   0.7599025
## 5          F 249.5790359 616.8585949  0.95 percentile 360.8070609
```

I bootstrapped 10,000 times. For each time, I performed regression analysis for log(sales) vs. log(price). The coefficient for log(price) is the exprected price elasticity, which is around -1.46. When the price increases by 1 %, the sales decreases at the 95% confidence level of [-1.78, -1.46].