Homework 1

P8108 - Survival Analysis

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Question 1

```
library(tidyverse)

# Load in Q1 and Q2 data
q1_df = read_csv("data/Q1data_extracted.csv")
q2_df = read_csv("data/Q2data_extracted.csv")
```

Part A

The MLE $\hat{\lambda}$ for an Exponential distribution is given by:

$$\hat{\lambda} = \frac{d}{\sum_i t_i} = \frac{\text{The number of events}}{\text{Persontime: total number of time units observed on all individuals}}$$

Using R to calculate:

```
# Calculate number of events and persontime for relapse
d_relapse = sum(pull(q1_df, Relapse))
sum_time_relapse = sum(pull(q1_df, Relapse_Time))

# Calculate relapse MLE
mle_relapse = d_relapse/sum_time_relapse

# Calculate number of events and persontime for death
d_death = sum(pull(q1_df, Death))
sum_time_death = sum(pull(q1_df, Death_Time))

# Calculate death MLE
mle_death = d_death/sum_time_death
```

`mle_relapse` $\hat{\lambda}_{relapse} = 0.032$

`mle_death` $\hat{\lambda}_{death} = 0.013$