

```
#=====
# This script contains work for ENVE 660 Midterm
# Question #5
#
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# 2018-02-09
#=====
```

Reading in required libraries

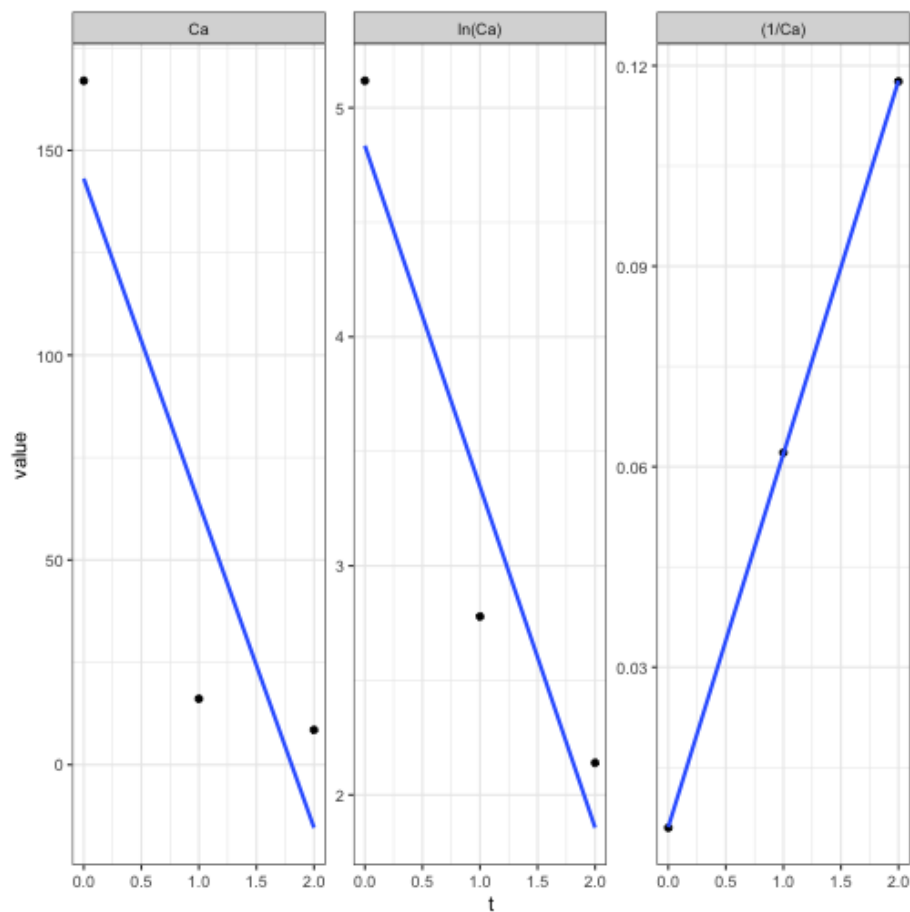
```
library(tidyverse)
```

Writing in experimental data

```
df <-tribble(
  ~t, ~Ca,
  0, 167,
  1, 16.1,
  2, 8.5
)
```

Plotting zero, first, and second order relationships as Ca vs t, ln(Ca) vs t, and (1/Ca) vs t, respectively

```
df %>%
  mutate(
    ln_Ca = log(Ca), # log() function defaults to ln()
    Ca_inv = (1/Ca)
  ) %>%
  gather(key = order, value = value, Ca:Ca_inv) %>%
  mutate(order = factor(order, levels = c("Ca", "ln_Ca", "Ca_inv"),
    labels = c("Ca", "ln(Ca)", "(1/Ca)"))) %>%
  ggplot(aes(t, value)) +
  facet_wrap(~ order, scales = "free") +
  geom_point() +
  geom_smooth(method = "lm", se = FALSE) +
  theme_bw()
```



Linear model fit to $(1/Ca)$ vs t since it has the best fit

```
model <- df %>%
  mutate(Ca_inv = 1/Ca) %>%
  lm(Ca_inv ~ t, data = .)
```

getting the model coefficients $k = \text{'r broom::tidy(model)estimate[[1]]'}$

```
broom::tidy(model)

##           term      estimate  std.error statistic    p.value
## 1 (Intercept) 0.006086111 0.0002193283   27.74886 0.022932275
## 2            t 0.055829517 0.0001698910   328.61962 0.001937248

broom::glance(model)

##   r.squared adj.r.squared      sigma statistic    p.value df logLik
```

```
## 1 0.9999907      0.9999815 0.0002402622 107990.9 0.001937248 2 22.39244
##      AIC      BIC      deviance df.residual
## 1 -38.78488 -41.48905 5.772591e-08      1
```