Project 3 - COVID19 Model

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4/16/2020

Read in data:

```
covid19 <- read_csv("covid19-1.csv")
```

```
## Parsed with column specification:
## cols(
##   Id = col_double(),
##   `Province/State` = col_character(),
##   `Country/Region` = col_character(),
##   Lat = col_double(),
##   Long = col_double(),
##   Date = col_character(),
##   ConfirmedCases = col_double(),
##   Fatalities = col_double()
## )
```

Explore data - NY Example:

```
NY_dat = covid19 %>% filter(`Province/State` == "New York")

#Initialize column - time from 1st case
NY_dat$time_from_first_case <- rep(0, dim(NY_dat)[1])
#Find location of first confirmed case
case = sum(NY_dat$ConfirmedCases == 0)
#Fill in column
j = 1
for (i in (case+1):dim(NY_dat)[1]) {
  NY_dat$time_from_first_case[i] = j
  j = j+1
}

#Check whether logistic curve is good aproximation - cases
plot(ConfirmedCases ~ time_from_first_case, data = NY_dat)
```
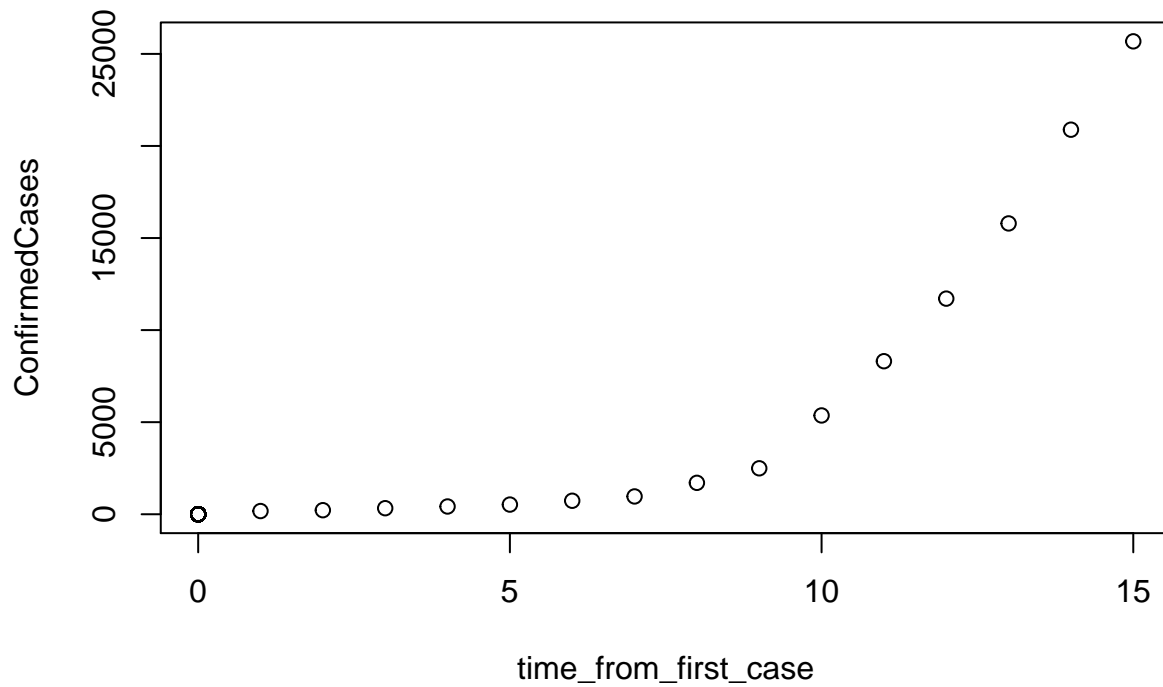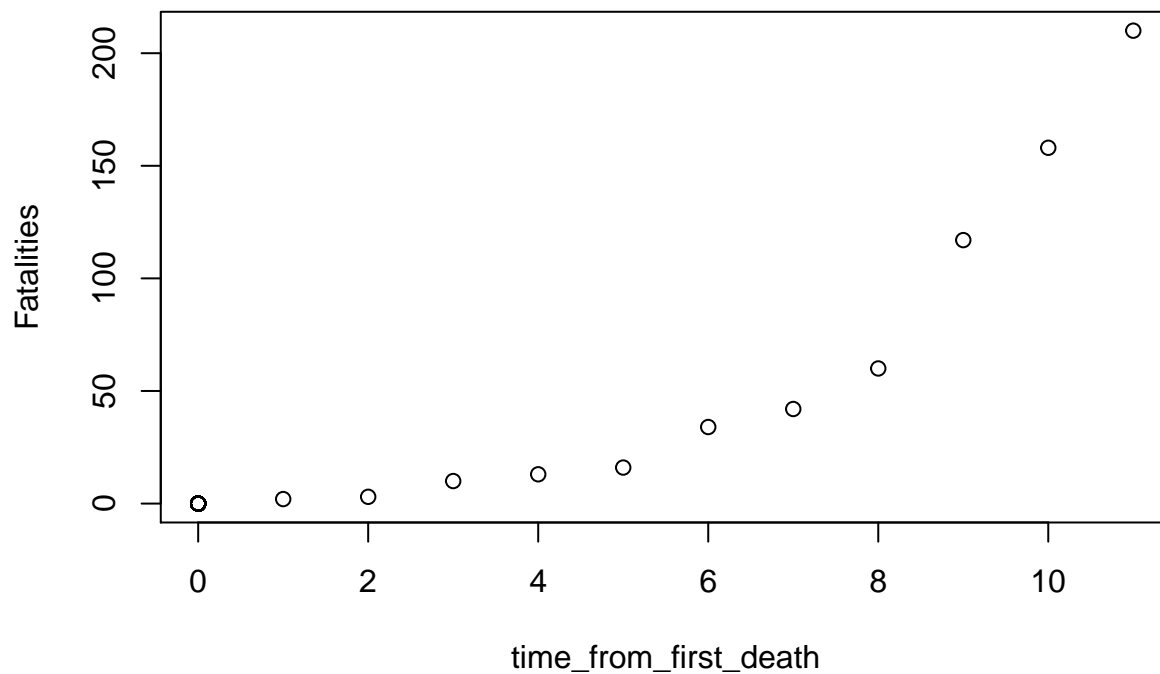
```r
#Initialize column - time from 1st death
NY_dat$time_from_first_death <- rep(0, dim(NY_dat)[1])
#Find location of first confirmed case
deaths = sum(NY_dat$Fatalities == 0)
#Fill in column
j = 1
for (i in (deaths+1):dim(NY_dat)[1]) {
  NY_dat$time_from_first_death[i] = j
  j = j+1
}

#Check wherher logistic curve is good aproximation - fatalities
plot(Fatalities ~ time_from_first_death, data = NY_dat)
```

```
#Appears to have exponential growth, will try logistic growth model however
```

Estimation of logistic growth curve parameters:

```
mod <- lm(ConfirmedCases ~ time_from_first_case, data = NY_dat)
coef(mod)
r <- coef(mod)[1]
K <- -r/coef(mod)[2]

#Doesn't work, haha :(
logisticModel <- nls(ConfirmedCases ~ K / (1 + exp(Po + r * time_from_first_case)),
                     data = NY_dat,
                     start = list(Po = 0, r = K, K = 100000))
```