Lab07

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Division and Power in the 1%

Part I

1.

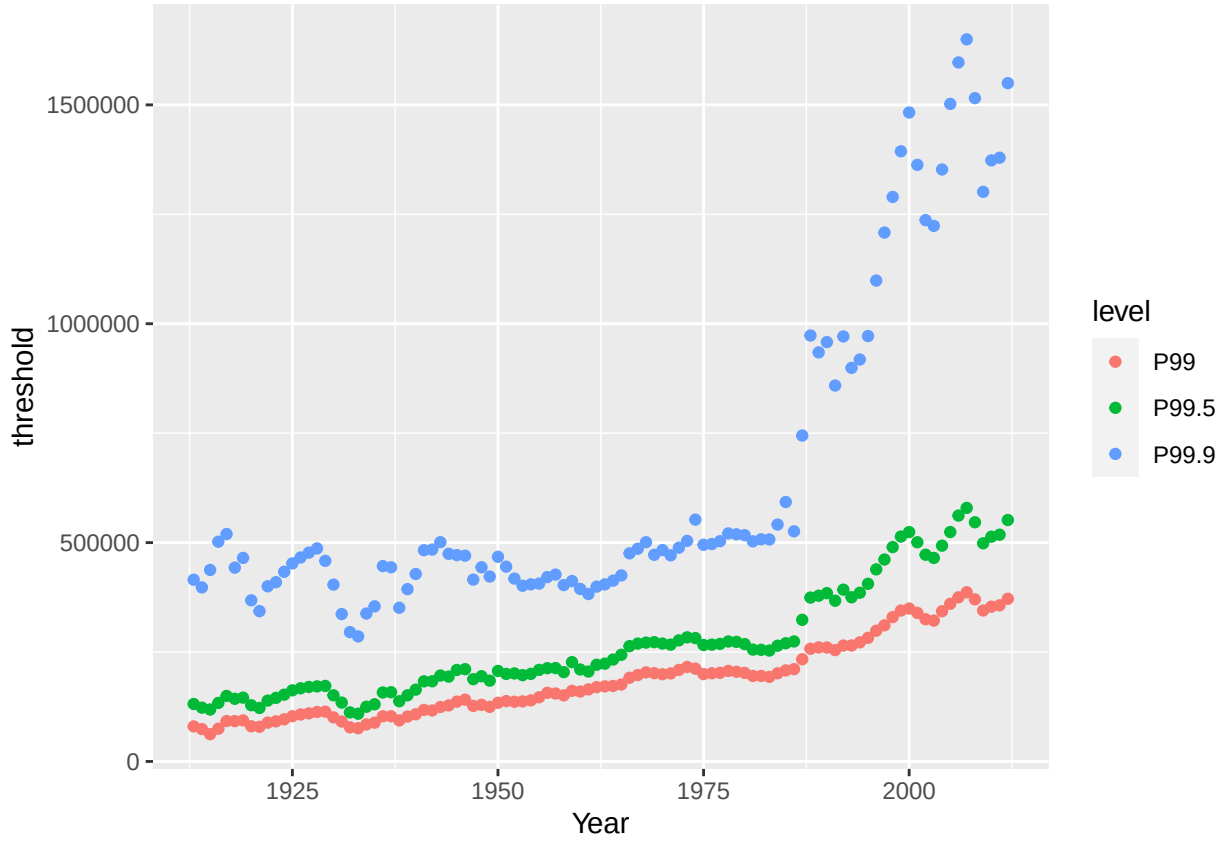
```
wt <- read_csv('data/wtid-report.csv') %>% dplyr::select(Year,`P99 income threshold`:`P99.9 income thres
```

```
## Parsed with column specification:
## cols(
##   Country = col_character(),
##   Year = col_double(),
##   `P90 income threshold` = col_double(),
##   `P95 income threshold` = col_double(),
##   `P99 income threshold` = col_double(),
##   `P99.5 income threshold` = col_double(),
##   `P99.9 income threshold` = col_double(),
##   `P99.99 income threshold` = col_double()
## )
```

```
wt.P99.1972 <- wt %>% filter(Year == 1972, level == 'P99')
wt.P99.5.1942 <- wt %>% filter(Year == 1942, level =='P99.5')
wt.P99.9.1922 <- wt %>% filter(Year == 1922, level == 'P99.9')
```

2.

```
ggplot(data = wt, aes(x = Year, y = threshold, color = level)) +
  geom_point()+
  xlim(1913,2012)
```



3.

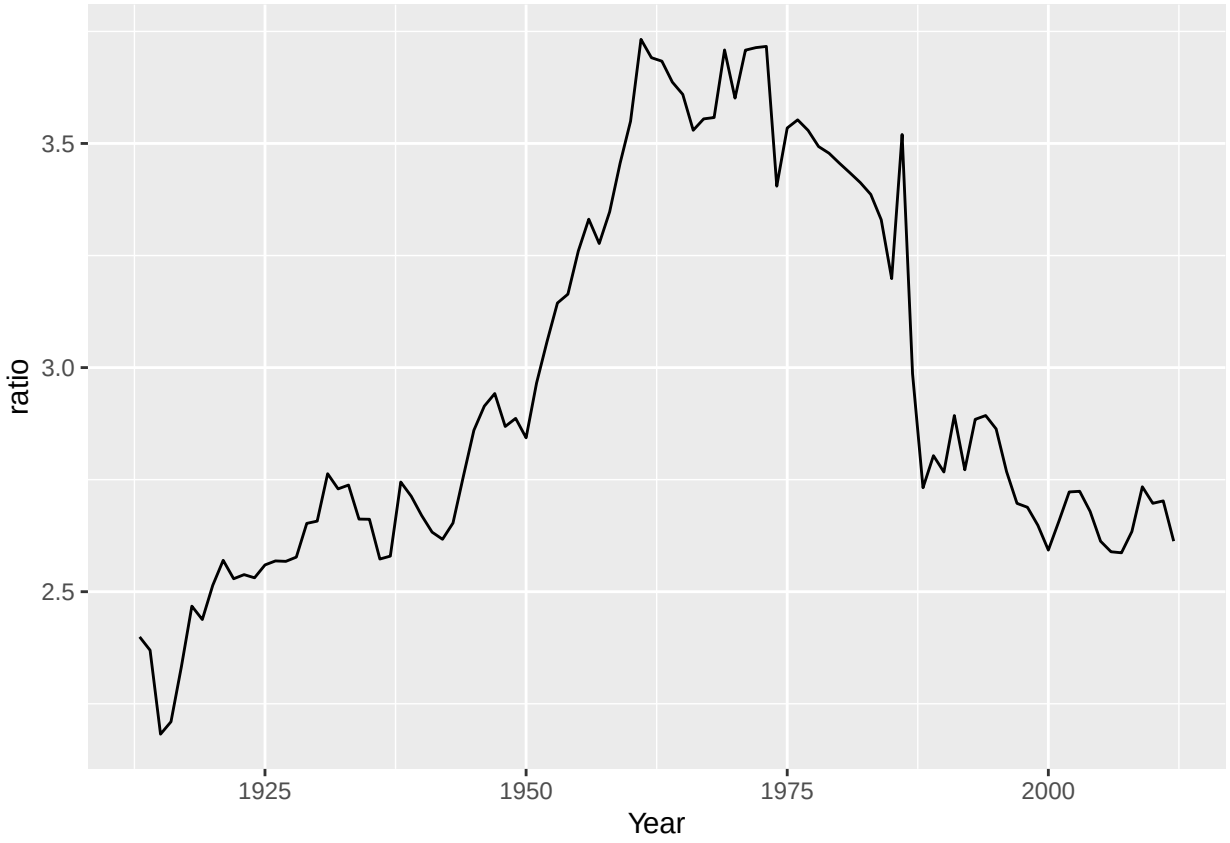
```
exponent.est_ratio <- function(x,y){
  return(1-log(10)/log(x/y))
}
exponent.est_ratio(1e6,1e7)
```

```
## [1] 2
```

Part II

4.

```
wt.P99 <- wt %>% filter(level == 'P99') %>% dplyr::select(threshold)
wt.P99.9 <- wt %>% filter(level == 'P99.9') %>% dplyr::select(threshold)
ratios <- exponent.est_ratio(wt.P99,wt.P99.9) %>%
  transmute(ratio = threshold) %>%
  mutate(Year = unique(wt$Year))
ggplot(data = ratios, aes(x = Year, y = ratio))+
  geom_line()
```



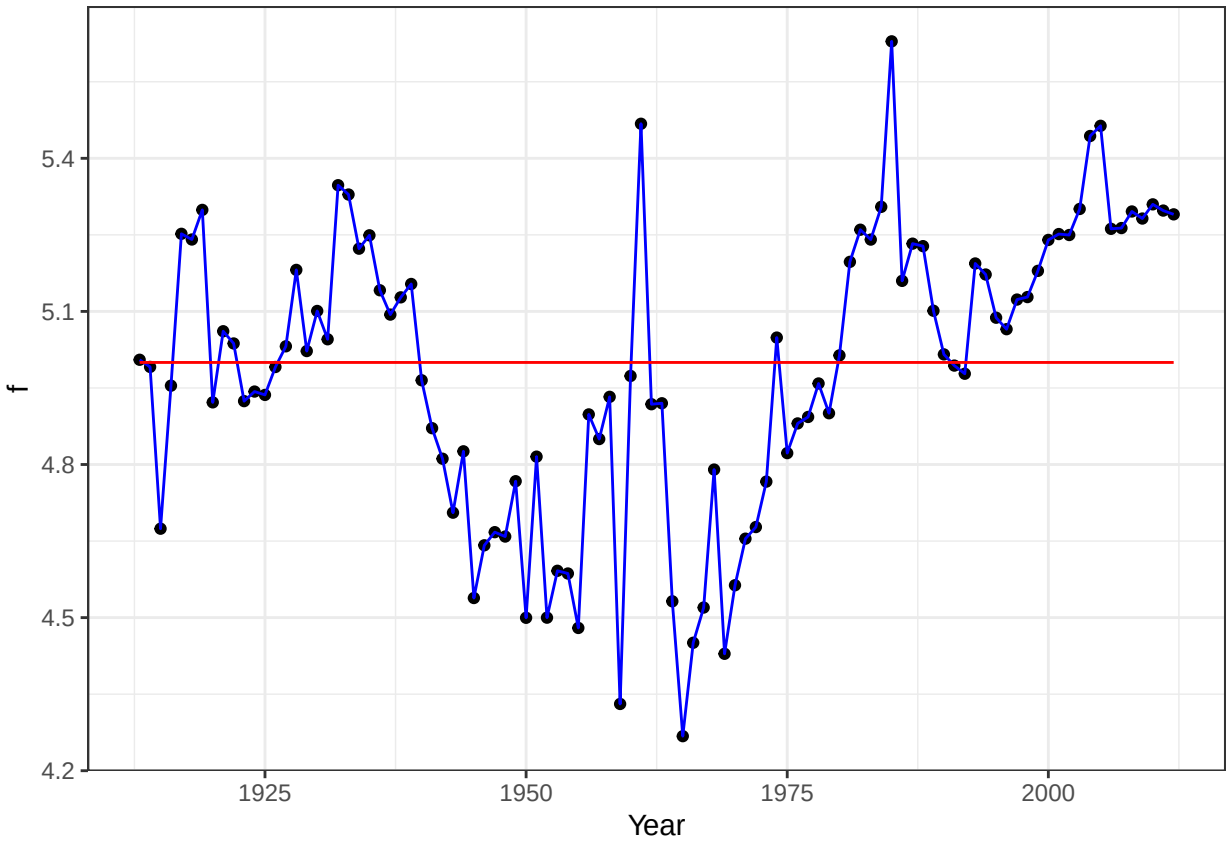
5.

```
ratio12 <- ratios %>% filter(Year == 2012) %>% dplyr::select(ratio)
xmin <- wt %>% filter(Year == 2012, level == 'P99') %>% dplyr::select(threshold)
160681*1000*(50000000/xmin)^(1-ratio12)
```

```
##   threshold
## 1  59248.53
```

6.

```
f <- function(x,y,a){
  return((x/y)^(1-a))
}
wt.P99.5 <- wt %>% filter(level == 'P99.5') %>% dplyr::select(threshold)
record <- f(wt.P99.5,wt.P99.9,ratios$ratio) %>%
  transmute(f = threshold) %>%
  mutate(Year = unique(wt$Year))
ggplot(data = record)+
  geom_point(aes(x = Year, y = f), color = "black")+
  geom_line(aes(x = Year, y = f), color = "blue")+
  geom_line(aes(x = Year, y = 5), color = "red")+
  theme_bw()
```



7.

```
wt1 <- read_csv('data/wtid-report.csv') %>%
  dplyr::select(Year, `P90 income threshold`, `P95 income threshold`) %>%
  transmute(Year = Year, P90 = `P90 income threshold`, P95 = `P95 income threshold`) %>%
  gather(key = 'level', value = 'threshold', -Year)
```

```
## Parsed with column specification:
## cols(
##   Country = col_character(),
##   Year = col_double(),
##   `P90 income threshold` = col_double(),
##   `P95 income threshold` = col_double(),
##   `P99 income threshold` = col_double(),
##   `P99.5 income threshold` = col_double(),
##   `P99.9 income threshold` = col_double(),
##   `P99.99 income threshold` = col_double()
## )
```

```
wt.P90 <- wt1 %>% filter(level == 'P90') %>% dplyr::select(threshold)
wt.P95 <- wt1 %>% filter(level == 'P95') %>% dplyr::select(threshold)
record1 <- f(wt.P90,wt.P95,ratios$ratio) %>% transmute(value = threshold) %>%
  mutate(Year = unique(wt1$Year))
ggplot(data = record1)+
  geom_point(aes(x = Year, y = value), color = "black")+
  geom_line(aes(x = Year, y = value), color = "blue")+
```

```
  geom_hline(yintercept = 2)+
  theme_bw()
```

```
## Warning: Removed 4 rows containing missing values (geom_point).
```

```
## Warning: Removed 4 row(s) containing missing values (geom_path).
```