



MACQUARIE
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STAT 1378: A Thomas Fung Appreciation Society

Assignment 3

28 October 2021



Intro

▶ Bullet 1

Use \alert to **highlight** some text

Some enumeration

- ▶ Bullet 1
- ▶ Bullet 2

Use \alert to **highlight** some text

Some enumeration

- ▶ Bullet 1
- ▶ Bullet 2
- ▶ Bullet 3

Use \alert to **highlight** some text

Some enumeration

- ▶ Bullet 1
- ▶ Bullet 2
- ▶ Bullet 3

Use \alert to **highlight** some text

Some enumeration

1. The first item

- ▶ Bullet 1
- ▶ Bullet 2
- ▶ Bullet 3

Use \alert to **highlight** some text

Some enumeration

1. The first item
2. Stuff

- ▶ Bullet 1
- ▶ Bullet 2
- ▶ Bullet 3

Use \alert to **highlight** some text

Some enumeration

1. The first item
2. Stuff
3. Nonsense

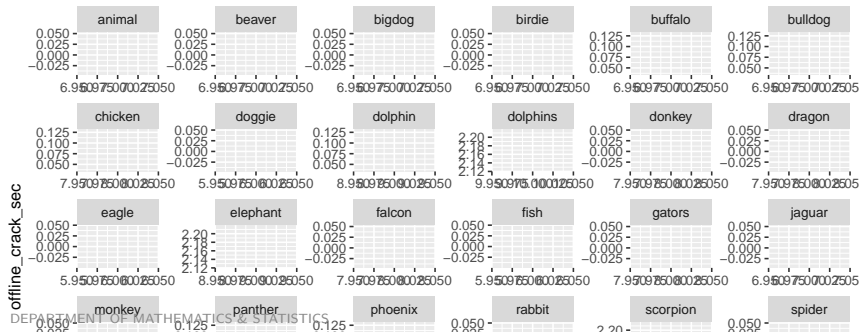


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Using R

```
plot1 <- passwords %>%  
  filter(category == "animal")  
  ggplot(data = plot1) +  
  geom_line(mapping = aes(x = strength, y = offline_crack_sec)) +  
  facet_wrap(~plot1$password, scales = "free") +  
  labs(title = "Plot #1: How the Three Lap (with no shortcut) develops overtime")
```

Plot #1: How the Three Lap (with no shortcut) develops overtime

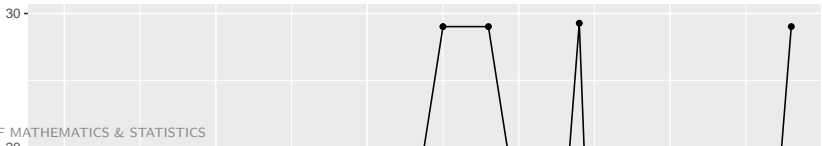


```
plot2 <- passwords %>%  
  filter(time_unit == "years" && rank < 100) %>%  
  group_by(interaction(strength,offline_crack_sec)) %>%  
  # mutate(Banana = paste(type,ifelse(shortcut == "Yes", "With Shourtcut", "With  
  # ggplot(aes(x = date, y = time, color = Race)) +  
  ggplot(aes(x = strength, y = offline_crack_sec)) +  
  geom_point() +  
  geom_line() +  
  labs(title = "Plot 2: A strength vs time crack chart", subtitle = "?", x = "S
```

plot2

Plot 2: A strength vs time crack chart

?



Suppose X_1, X_2, \dots, X_n are independent and identitically distributed random variables with common cumulative distribution function F_X with support on \mathbb{R} . The empirical cumulative distribution function is defined with,

$$F_n(x) = \frac{1}{n} \sum_{i=1}^n I_{(-\infty, x]}(X_i)$$

where $I_A(x)$ denotes the indicator function for the set A . The following theorem provides uniform coverage for F_n

Glivenko-Cantelli Theorem

If X_i are i.i.d. with common cdf F then,

$$\|F_n - F\| = \sup_{x \in \mathbb{R}} |F_n(x) - F(x)| \xrightarrow{n \rightarrow \infty} 0 \quad \text{almost surely.}$$

- See Vaart and Wellner (1996) for more information on Empirical processes.

A slide with no header if you need more space.

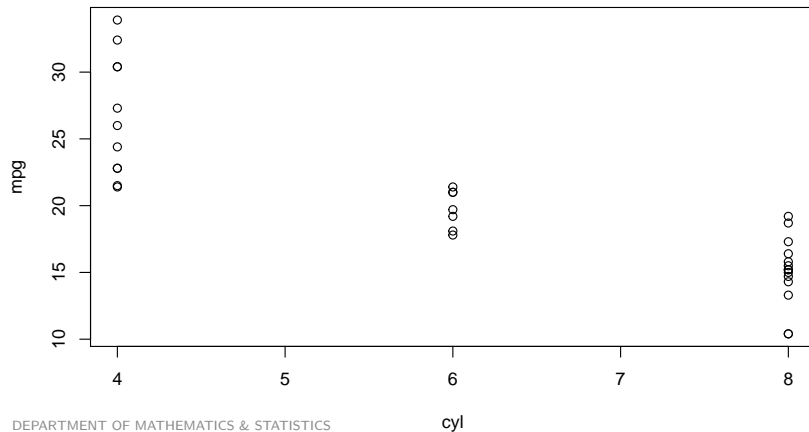


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RMarkdown Examples

R Figure

```
plot(mpg ~ cyl, data = mtcars)
```



A simple `knitr::kable` example:

```
knitr::kable(head(mtcars),  
  caption="First few observations of the mtcars dataset")
```

Table 1: First few observations of the mtcars dataset

	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
Mazda RX4	21.0	6	160	110	3.90	2.620	16.46	0	1	4	4
Mazda RX4 Wag	21.0	6	160	110	3.90	2.875	17.02	0	1	4	4
Datsun 710	22.8	4	108	93	3.85	2.320	18.61	1	1	4	1
Hornet 4 Drive	21.4	6	258	110	3.08	3.215	19.44	1	0	3	1
Hornet Sportabout	18.7	8	360	175	3.15	3.440	17.02	0	0	3	2
Valiant	18.1	6	225	105	2.76	3.460	20.22	1	0	3	1

- ▶ See the RMarkdown repository for more on RMarkdown

- ▶ See the RMarkdown repository for more on RMarkdown
- ▶ Also the

Vaart, Aad W. van der, and Jon A. Wellner. 1996. *Weak Convergence and Empirical Processes*. Springer Series in Statistics. Springer-Verlag, New York.
<https://doi.org/10.1007/978-1-4757-2545-2>.