Week 6 6.4 Note

1. Extra R Commands

- `set.seed(1)`:
  - Ensures the same simulation, `1` can be any number (simulation NO.1).
- `sample()`:
  - Create the simulation (event).
    - Example:

```r
# 10 fair coin tossing:
sample1 = sample(c("H", "T"), 10, replace = T)
# Explanation:
# c("H", "T"): 2 possible events, head and tail
# 10: toss it 10 times
# replace = T: use replacement

table(sample1)/10
```

- `replicate()`:
  - To replicate a single event multiple times.
    - Example:

```r
# 10 fair coin tossing:
sample2 = replicate(10, sample(c("H", "T"), 1))
# Explanation:
# 10: replicate the tossing 10 times
# 1: 1 tossing

table(sample2)/10
```

- `rbinom()`:
  - Simulate the outcome of any simulations that involve a binomial distribution.
    - Example:

```r
# 10 fair coin tossing:
sample3 = rbinom(n = 10, 1, 0.5)
# Explanation:
# n = 10: replicate the event 10 times
# 1: 1 tossing
# 0.5: the chance of getting head or tail is 0.5 (50%)

table(sample3)/10
```

- Binomial Functions: *Suppose we have 10 trials and P(Event) = 0.3.*
  - `dbinom()`:
    - Example:

```r
# The chance of getting 4 events is:
dbinom(4, 10, 0.3) # dbinom(x, n, p)
```

- `pbinom()`:
  - Example:

```r
# The chance of getting less than or equal to 5 events is:

# We can still use the dbinom() function:
sum(dbinom(0:5, 10, 0.3))
# Explanation:
# 0:5: the chance of getting 0 event to 5 events
# sum(): sum each chance up to get the overall probability

# Or use the pbinom() function:
pbinom(5, 10, 0.3) # dbinom(x, n, p)
# Explanation:
# 5: the chance of getting less than or equal to 5 events
```