

**Due Date: October 8th, 2021**

*Problems Due: 1,3,5*

1. Suppose `x` is a vector. Describe what each of the below commands do.

```
> length(x)
> x[2]
> x[-2]
> x[1:5]
> x(length(x) - 5 : length(x))
> x[c(1,3,5)]
> x[x>3]
> x[x<-2 | x>2]
> which(x == max(x))
```

2. Consider the dataset `diamonds` in `ggplot2` in R.

- (a) In two to three lines describing the dataset.
- (b) Write down the list of categories considered.
- (c) Construct a Bar Plot using the below command:

```
i. > library(ggplot2)
> ggplot(data=diamonds) +
+   geom_bar(mapping=aes(x=cut, fill=clarity))+
+   scale_fill_viridis_d()

ii. > ggplot(data=diamonds) +
+   geom_bar(mapping=aes(x=cut, fill=clarity), position="dodge") +
+   scale_fill_viridis_d()
```

and describe the differences in the outputs.

3. Load the package `UsingR` consider the dataset `cavendish`.

- (a) In two to three lines describing the dataset.
- (b) Provide the five number summary of the three variables considered using the `summary` function.

4. Suppose we roll a dice five times. Let  $Y$  be the sum of the outcomes in each roll. Find the distribution of  $Y$ .

5. Toss a fair coin: if head roll a 1-6 flat die (i.e 1,6 have probability  $\frac{1}{4}$  and 2,3,4,5 have probability  $\frac{1}{8}$ ); and if tail roll a 3-4 flat die (i.e 3,4 have probability  $\frac{1}{4}$  and 1,2,5,6 have probability  $\frac{1}{8}$ ). Let  $X$  be the outcome of the toss of a coin. Let  $Y$  be the outcome of the roll of the die.

- (a) Find the conditional distribution of  $Y|X = Head$
  - (b) Find the conditional distribution of  $Y|X = Tail$
  - (c) Find the  $P(X = Head|Y = 3)$
6. Complete Worksheet 2.

### **Book-Keeping Exercises**

From Probability and Statistics with Examples Using R

- 1. Ex 1.1.3
- 2. Ex 1.2.12
- 3. Example 1.3.10,1.3.12
- 4. Ex 1.3.9
- 5. Ex 1.3.10
- 6. Ex 1.3.13