Andrew Gordon

Professor Mike Nelson
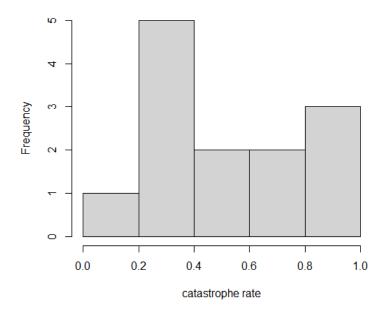
ECO 602

7 November 2021

<div align="center">Using Models 1</div>

Q1

<div align="center">**Gordon - Histogram of Catastrophe Rates**</div>

A histogram titled "Gordon - Histogram of Catastrophe Rates" with x-axis labeled "catastrophe rate" ranging from 0.0 to 1.0, and y-axis labeled "Frequency" ranging from 0 to 5. Bars: 0.0–0.2 has frequency 1, 0.2–0.4 has frequency 5, 0.4–0.6 has frequency 2, 0.6–0.8 has frequency 2, 0.8–1.0 has frequency 3.

Q2

```
shapiro.test(catrate$cat.rate)
```

```
Shapiro-Wilk normality test
```

```
data:   catrate$cat.rate
```

```
W = 0.86202, p-value = 0.04097
```

Q3

The null hypothesis of the Shapiro test claims that the data follows a normal distribution.

Q4

A p-value less that 0.05 indicates that we should reject the null hypothesis. Being that the p-value

for this Shapiro test is 0.04, this means that the distribution of catastrophe rates does not follow a

normal distribution.

Q5

```
t.test(catrate$cat.rate, mu= (2/7))
```

```
        One Sample t-test
```

```
        data:   catrate$cat.rate
```

```
        t = 2.9595, df = 12, p-value = 0.01193
```

```
        alternative hypothesis: true mean is not equal to 0.2857143
```

```
95 percent confidence interval:

 0.3526250 0.7261295

sample estimates:

mean of x

0.5393773
```

Q6

The null hypothesis of the t test claims that the average catastrophe rate is equal to the observed

late filling rate of ~0.28

Q7

This is a 2 tailed test

Q8

p-value = 0.01193

This p-value tells us that the average rate of late pond-filling was not equal to the observed rate

of filling which happened in two out of seven years

Q9

The confidence interval was between 0.3526250 and 0.7261295. This interval does not include

zero.

Q10

Yes, I believe there was strong evidence to reject the null hypothesis. The p value of this t test is significantly less than the alpha value of 0.05, indicating that we should reject the null hypothesis.

Q11

wilcox.test(catrate$cat.rate, mu = 2 / 7)

Q12

The p value of the Wilcox test is 0.00628. The p-value of the t-test was 0.01193.

Q13

Yes, the rank sum test supports that I should reject the null hypothesis. The p-value of 0.00628 is significantly smaller than the alpha value of 0.05

Q14

Both the t test and the Wilcoxon rank sum test conclude that the true average of the catastrophe rates is not equal to the observed rate of 0.28.

Q15

I believe the Wilcoxon test was more appropriate for this data. This type of test is more appropriate when used on small samples from a non-normal distribution. As you can see in the histogram of catastrophe rates (Q1), this distribution is non-normal. Also, the p value pf the Wilcoxon test is significantly smaller than the p value of the t-test, which means we can be more certain to reject the null hypothesis in the Wilcoxon test.

Q16

```
dat_adelie = subset(penguin_dat, species == "Adelie")

dat_chin = subset(penguin_dat, species == "Chinstrap")



shapiro.test(dat_adelie$flipper_length_mm)

shapiro.test(dat_chin$flipper_length_mm)
```

Q17

Yes, I believe that the flipper lengths of both species follow normal distributions. The null

hypothesis of a Shapiro-Wilk test states that the data are samples from a normally-distributed

population. The normality test for Adelie penguins gave a p value output of 0.72, while the p-

value for Chinstrap penguins was 0.8106. Both of these values are greater than an alpha value of

0.05, meaning we fail to reject the null hypothesis.

Q18

(file included)

```
par(mfrow = c(1,2))



hist(dat_adelie$flipper_length_mm,

    main = "Histogram of Adelie flipper lengths",

    xlab = "flipper length mm")
```

```
hist(dat_chin$flipper_length_mm,

     main = "Histogram of Chinstrap flipper lengths",

     xlab = "flipper length mm")
```

Q19

The alternative hypothesis of this t test claims that the average flipper lengths of the Adelie and Chinstrap penguins are not equivalent

Q20

```
t.test(

  x = dat_adelie$flipper_length_mm,

  y = dat_chin$flipper_length_mm,

)
```