R Lab 4: Nightlight use and myopia

Chi-square Test

Team Captain: NAME HERE   Facilitator: NAME HERE
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Invalid Date

In a study reported in *Nature* (Quinn, 1999), a survey of 479 children found that those who had slept with a nightlight or in a fully lit room before the age of two had a higher incidence of nearsightedness (myopia) later in childhood.

In this study, there were two variables studied:

- `Light`: level of light in room at night (no light, nightlight, full light)
- `Sight`: level of myopia developed later in childhood (high myopia, myopia, no myopia).

1. Which variable is the explanatory variable? Which is the response variable?

2. Read in the data and print out the top 6 rows. What is the observational unit for this study?

```
# read in data
myopia <- read_csv("data/ChildrenLightSight.csv")
# print top 6 rows
```

3. Complete the code to visualize the `Light` and `Sight` variables together as a *filled* bar plot.

```
# Code to create the filled barplot
ggplot(data = myopia,
       mapping = aes(x = _____,
                     fill = _____)
       ) +
  geom_bar(position = "_____") +
  labs(x = "_____",
       y = "_____",
       title = "_____")
```

1

```
Error: <text>:3:27: unexpected input
2: ggplot(data = myopia,
3:         mapping = aes(x = __
                                ^
```

4. The code above creates the filled bar plot. What part of the code would change if you wanted to create a stacked or dodged bar plot instead?

5. Fill in the code below to generate a contingency table of the counts.

```
myopia |>
  count(____, ____) |>
  pivot_wider(names_from = Sight, values_from = n) |>
  adorn_totals(where = c("row", "col"))
```

```
Error: <text>:2:10: unexpected input
1: myopia |>
2:   count(__
            ^
```

6. How many children slept with a nightlight?

7. How many children who slept with a nightlight have normal levels of Myopia?

8. What proportion of children who slept with a nightlight have normal levels of Myopia? *You may choose to use the code chunk below as a calculator.*

9. Fill in the code below to generate a contingency table of the *proportions*.

```
myopia |>
  count(Light, Sight) |>
  pivot_wider(names_from = Sight,
              values_from = n
              ) |>
  adorn_totals(where = c("row", "col")) |>
  adorn_percentages(denominator = "____")
```

```
Error in adorn_percentages(adorn_totals(pivot_wider(count(myopia, Light, : 'denominator' must
```

10. Using the filled bar plot and the proportion contingency table above, do you think the proportion of all people with Myopia differs between the different levels of light? Explain your answer.

11. Write out the parameters of interest for this study.

12. Write out the null and alternative hypotheses to test whether the level of light is associated with the presence of Myopia.

13. Check the conditions necessary to use the Chi-square distribution to test our hypotheses.

14. Complete the code below to conduct a Chi-square Test.

```
chisq_test(x = myopia,
           response = _____,
           explanatory = _____
           )
```

```
Error: <text>:2:24: unexpected input
1: chisq_test(x = myopia,
2:             response = __
                            ^
```

15. Write a conclusion in context of the study. Make sure to cite the test statistic, degrees of freedom, and p-value.