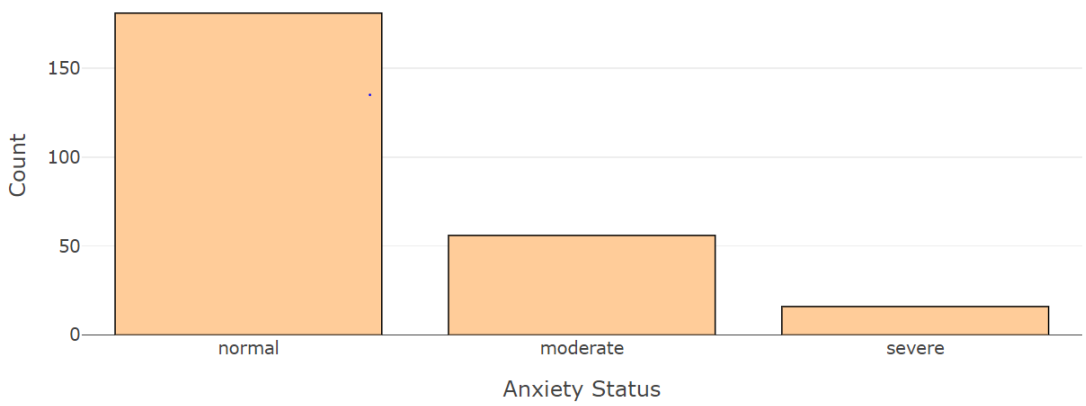
Practice Assignment: Normal Distributions (Continued)

Questions 1–3: In past in-class activities (3.A and 4.A), you worked with data from a study that explored the connection between sleep and academic performance in college students.[1] Here is a reminder about the four variables you'll see today:

- *Anxiety Status*: Coded anxiety score—normal, moderate, or severe
- *Average Sleep*: Average hours of sleep for all days of the week
- *Drinks*: Number of alcoholic drinks per week
- *Weekday Sleep*: Average hours of sleep for weekdays

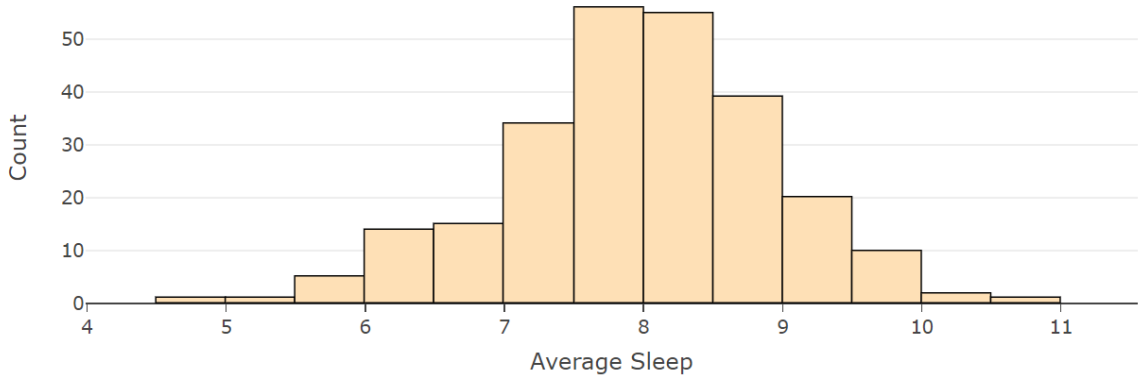
1) The following are four graphs representing each variable. Which variable is best fit by the normal distribution?

a)

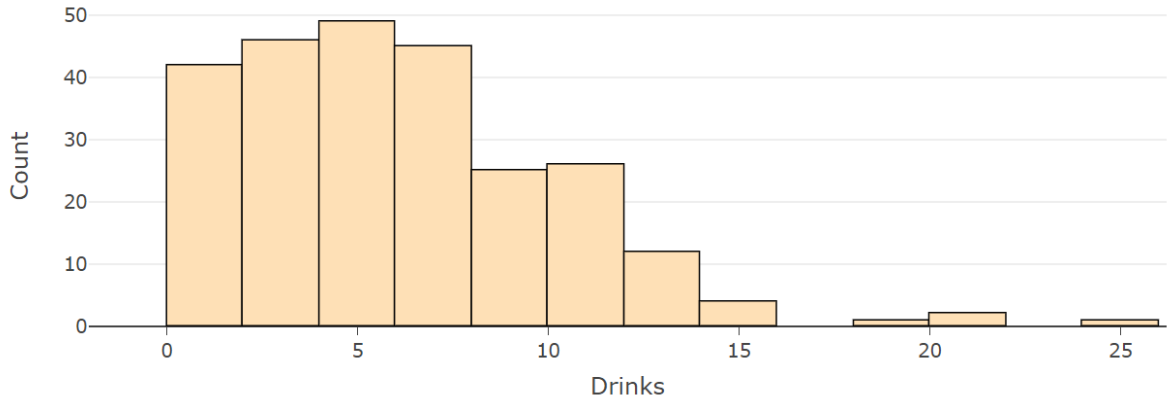


b)

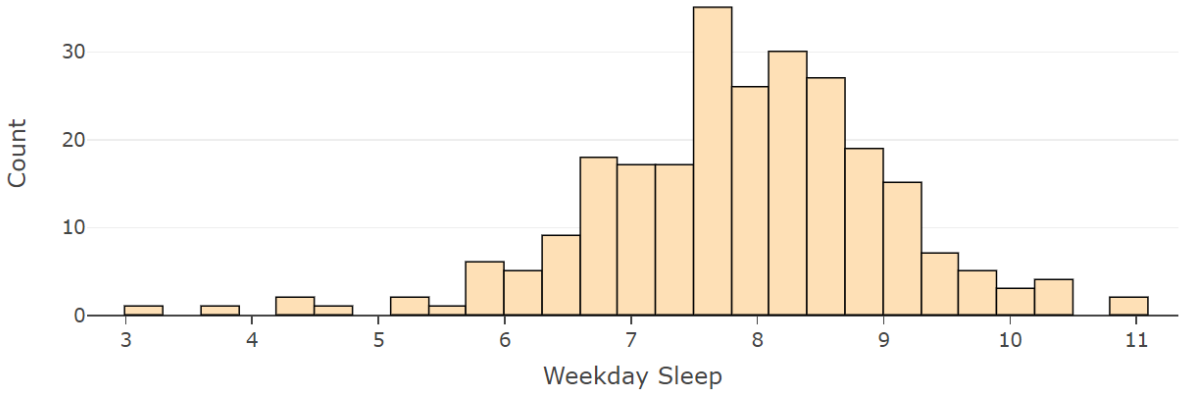
[1] Onyper, S. V., Thacher, P. V., Gilbert, J. W., & Gradess, S. G. (2012). Class start times, sleep, and academic performance in college: A path analysis. *Chronobiology International, 29*(3), 318-335.



c)



d)



Answer: b

2) Justify your answer to Question 1. Explain both why you chose the variable you did and why you did not choose the other variables.

Answers will vary.

Sample answer: *Average Sleep* is bell shaped and mostly symmetrical. *Anxiety Status* is categorical, not quantitative. *Drinks* is discrete and skewed. *Weekday Sleep* is skewed.

[Continued on the next page.]

3) The mean for *Average Sleep* is 7.97, and the standard deviation is 0.965.

Part A: The National Sleep Foundation recommends an average of 7–9 hours of sleep for young adults.[2] Estimate the percentage of college students who meet these guidelines. Round your answer to the nearest hundredth.

Answer: 69.97%

Part B: How does the recommendation compare to the *Average Sleep* data from the college student study?

Answers will vary.

Sample answer: Seven is almost exactly 1 standard deviation below the mean, and 9 is almost exactly 1 standard deviation above the mean. The recommended range is from a z-score of -1 to a z-score of $+1$.

Part C: Estimate the percentage of college students who get less than 6 hours of sleep on average. Round your answer to the nearest hundredth.

Answer: 2.06%

Part D: Estimate the percentage of college students who get more than 10 hours of sleep on average. Round your answer to the nearest hundredth.

Answer: 1.77%

[2] Suni, E. (2021, March 10). *How much sleep do we really need?* Sleep Foundation. https://www.sleepfoundation.org/how-sleep-works/how-much-sleep-do-we-really-need

Part E: A college student says, “I only get about 4 or 5 hours of sleep every night. Is this unusual?” Write a response of two or three sentences that includes a discussion of the Empirical Rule to support your answer.

Answers will vary.

Sample answer: The mean is 7.97, so the Empirical Rule says that 99.7% of values will fall between 5.1 and 10.9. Only sleeping 4–5 hours would fall below this range, making it unusual.

Part F: A different student says, “I get more sleep that 90% of my peers.” The student’s fitness tracker shows that the student gets an average of 8.5 hours of sleep per night. Do you agree with the student’s statement? Explain.

Answers will vary.

Sample answer: No; 8.5 hours is only more than about 71% of students.

Part G: How many hours per night on average would the student need to sleep in order for the previous statement to be true? Round your answer to the nearest hundredth.

Answer: 9.21 hours