12.1 Exercises

CONCEPT CHECK

1. _____ is the understanding of the particular field of interest for the question being investigated.

2. When forming the questions to be answered, it is important to avoid subjective _____.

3. True or False: When working through the steps of the scientific method for data science, you cannot backtrack to a previous step.

4. True or False: In data science, a broad and less-defined question will yield more useful results than a narrow and well-defined question.

APPLICATIONS

5. As part of a research project, you need to analyze the effects of caffeine on the productivity of nightshift workers. Answer the following questions to outline how you would work through the scientific method for data science.
   - **a.** What question can you pose to start your investigation?
   - **b.** Where might you find the data related to your investigation?
   - **c.** What are some ways you might explore the data to notice patterns or trends?
   - **d.** What are some ways you can model the data once it is cleaned up?
   - **e.** What might be an engaging way to communicate the results given the topic of the project?

6. As part of a research project, you need to help a local restaurant determine what type of weekly special will increase sales. Answer the following questions to outline how you would work through the scientific method for data science.
   - **a.** What question can you pose to start your investigation?
   - **b.** Where might you find the data related to your investigation?
   - **c.** What are some ways you might explore the data to notice patterns or trends?
   - **d.** What are some ways you can model the data once it is cleaned up?
   - **e.** What might be an engaging way to communicate the results given the topic of the project?

7. As part of a research project, you need to determine the minimum inventory a store should keep in stock to be prepared for Thanksgiving holiday shopping. Answer the following questions to outline how you would work through the scientific method for data science.
   - **a.** What question can you pose to start your investigation?
   - **b.** Where might you find the data related to your investigation?
   - **c.** What are some ways you might explore the data to notice patterns or trends?

d. What are some ways you can model the data once it is cleaned up?

e. What might be an engaging way to communicate the results given the topic of the project?

Identify a weakness in each research question. Then, give three stronger alternative questions.

8. When is the best time to post on social media?

9. How should the next iteration of the flagship smartphone be updated?

10. How does the consumption of aspartame affect overall health in comparison to the consumption of sugar?

11. Is it better to brush your teeth before flossing or better to floss before brushing your teeth?

12. Will an afterschool tutoring program improve student performance?

13. Does meditating improve focus?

For each situation, identify three questions that a data scientist who is unfamiliar with the specific domain knowledge indicated can ask their team to help strengthen their research process.

14. A sales and marketing department want to know how they can improve packaging to make a low-selling product look more enticing to customers.

15. The owner of a bakery wants to know the best way to increase sales of beverages that are sold along with the baked goods.

16. A nonfiction book publisher wants to know if they should extend their product lines into historical nonfiction books.

17. The human resources department of a company is interested in learning what steps can be taken to increase employee retention.

18. A small business wants to know how to decrease the time spent processing orders for shipment.

19. The owner of a museum wants to know the best way to redesign the ticket lobby so there is less congestion between the ticket lines and the entrance and exit of the museum.