Warm Up:
What is the difference between completely randomized design and randomized blocked design?

Learning Goals: Identify when it is appropriate to make an inference about a population and when it is appropriate to make an inference about cause and effect. Evaluate if a statistical study has been carried out in an ethical manner.

Does listening to music improve GPA?

Some students at your school claim that listening to music while studying will help improve their GPA. Design a study to help discover if this claim is true.

Here are four proposed studies for investigating the question of the day. Suppose we found out that the mean GPA of students who listen to music is significantly lower than the mean GPA of students who didn’t listen to music. What conclusions could we make? Can we generalize and can we determine causation?

1.) Get all the students in your statistics class to participate in a study. Ask them whether or not they study with music on and divide them into two groups based on their answer to the question.

Random Sample? No Random Assignment? No

Conclusion: No inference about population or causation. Specific class there is correlation.
2.) Select a random sample of students from your school to participate in a study. Ask them whether or not they study with music on and divide them into two groups based on their answer to this question.

Random Sample? **Yes**  Random Assignment? **No**

**Conclusion:**

- **Inference about population**
- For all students in the school, there is **correlation**

3.) Get all the students in your statistics class to participate in a study. Randomly assign half of the students to listen to music while studying for the entire semester and have the remaining half abstain from listening to music while studying.

Random Sample? **No**  Random Assignment? **Yes**

**Conclusion:**

- **Inference about causation**
- For specific class listening to music while studying caused **lower GPAs**

4.) Select a random sample of students from your school to participate in a study. Randomly assign half of the students to listen to music while studying for the entire semester and have the remaining half abstain from listening to music while studying.

Random Sample? **Yes**  Random Assignment? **Yes**

**Conclusion:**

- **Inference about population and causation**
- For all students at the school, listening to music while studying caused **lower GPAs**

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**Coursework:**

pg 269 # 102-108