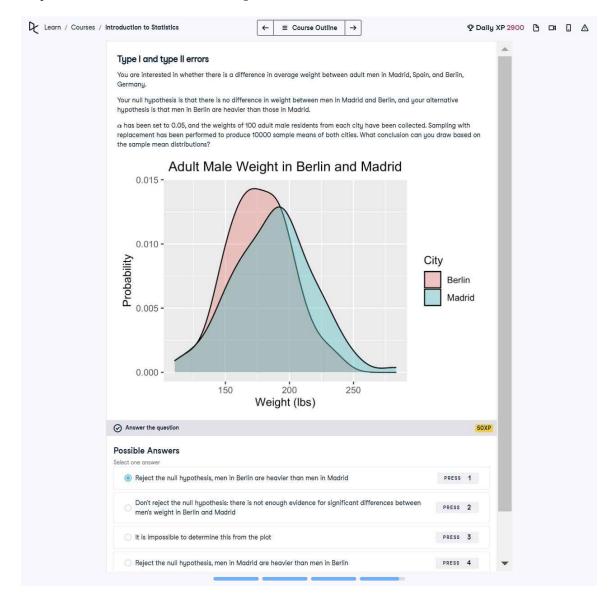# Type I and Type II Errors

You are interested in whether there is a difference in average weight between adult men in Madrid, Spain, and Berlin, Germany.

Your null hypothesis is that there is no difference in weight between men in Madrid and Berlin, and your alternative hypothesis is that men in Berlin are heavier than those in Madrid.

α has been set to 0.05, and the weights of 100 adult male residents from each city have been collected. Sampling with replacement has been performed to produce 10,000 sample means of both cities. What conclusion can you draw based on the sample mean distributions?

Answer

Answer: Don't reject the null hypothesis; there is not enough evidence for significant differences between men's weight in Berlin and Madrid.

Explanation: The plot shows overlap between the distributions of weights for men in Berlin and Madrid, indicating that the observed differences in means may not be statistically significant. Therefore, the null hypothesis cannot be rejected.

Explanation of the Answer

1. **Null and Alternative Hypotheses:**
- Null hypothesis (H_0): There is no difference in weights between men in Berlin and Madrid.
- Alternative hypothesis (H_1): Men in Berlin are heavier than men in Madrid.

2. **Interpreting the Plot:**
- The density plot shows substantial overlap between the distributions of weights for Berlin and Madrid.
- This overlap suggests that the observed difference in means may be due to sampling variability rather than a true effect.

3. **Decision Based on α:**
- With $\alpha = 0.05$, we require strong evidence (p-value $\leq \alpha$) to reject the null hypothesis. The overlap in distributions suggests that this threshold is not met.