Compiled by: Mr. Loren L. Spencer

Recipe for Success: Type I Errors

Type I Error-The probability of Rejecting the null given that the null is True.

1. **Write the Hypothesis**
   - Null H_0:
   - Alternative H_A:

α = the probability of committing a Type I error
β = the probability of committing a Type II error
1- β = the power of the test

2. **Define parameter (μ or p) in context**

3. **Define a Type I Error α**

Definition: *The probability of rejecting the Null given that the Null is true.*

Remember: To commit a **Type I Error**, we must have **rejected the null** and were incorrect

simplified definition: *Rejecting a true Null and Accepting a False Alternative*

4. **Explain a Type I Error in Context of the problem**

In this case, the probability of rejecting_____(*Restate* H_0)in favor of _____(*Restate* H_A)given the fact_____(*Restate* H_0)is true.

5. **Explain the consequences of Committing a Type I Error**

The consequences for committing at Type I Error are…

Explanation must be in the context and in simplified language.

Methods of Decreasing Type I Errors-α

In General:

As α ↓, power ↓, & β ↑

And

As α ↑, power ↑, & β ↓

1. **Decrease α – the level of significance**
   - Increases β-the probability of a Type II Error
   - More likely to accept a false null-*(this is an error)*
   - Power Decreases

2. **Decrease Power**
   - More likely to accept a false null—(Type II increases: negative)
   - Less likely to reject a true null—(Type I decreases: positive)

3. **Increase Sample Size**
   - Decreases Type II Error
   - Increases Power
   - (Costs money and Time)

P-value

1. **Write the Hypothesis**
   - Null H_0:
   - Alternative H_A:

2. **Define parameter (μ or p) in context**

3. **Define P-value**

P-value is the probability of getting a test statistic as extreme or more extreme given that the null is true.

4. **Explain P-value in the Context of the problem**

There is a _____(*P-value*)% chance that we would get a test statistic this extreme in favor of_____(*Restate* H_A) when in fact_____(*Restate* H_0) is true

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Recipe for Success: Type II Errors

Type II Error-The probability of Accepting the null given that the null is False.

1. **Write the Hypothesis**
   - Null H_0:
   - Alternative H_A:

α = the probability of committing a Type I error
β = the probability of committing a Type II error
1- β = the power of the test

2. **Define parameter (μ or p) in context**

3. **Define a Type II Error β**

Remember: to commit a **Type II Error** we **failed to reject** the null and were incorrect.

Definition: The probability of accepting the Null given that it is false.

simplified definition: Accepting a False Null and Rejecting a True Alternative

4. **Explain Type II Error in Context of the problem**

In this case, the probability of accepting_____given that
Restate H_0
_____is false and _____is true.
Restate H_0 *Restate* H_A

5. **Explain the consequences of Committing a Type II Error**

The consequences for committing a Type II Error are…

Explanation must be in the context and in simplified language.

Methods of Decreasing Type II Errors- β

As β ↓, power ↑, & α ↑

And

As β ↑, power ↓, & α ↓

1. **Increase α – the level of significance**
   - Increases-the probability of a Type I Error α
   - More likely to reject a True Null—*(this is an error)*
   - Power Increases

2. **Increase Power**
   - More likely to reject a true null—(Type I increases: negative)
   - Less likely to accept a false null—(Type II decreases: positive)

4. **Increase Sample Size**
   - Decreases Type II Error
   - Increases Power
   - (Costs money and Time)

P-value

1. **Write the Hypothesis**
   - Null H_0:
   - Alternative H_A:

2. **Define parameter (μ or p) in context**

3. **Define P-value**

P-value is the probability of getting a test statistic as extreme or more extreme given that the null is true.

4. **Explain P-value in the Context of the problem**

There is a _____% chance that we would get a test statistic
P-value
this extreme in favor of_____ when in fact_____ is true
Restate H_A *Restate* H_0