Topic 9 Statistical Testing

1. Introduction

Hypothesis testing is the process of using sample data to test a claim about the value of a population parameter

2. P-value and alpha

- If p_value <= α, we reject H0
- If p_value >= $alpha$, we fail to reject h0

notes:

The P-value is a statement about the probability that the sample mean takes on specific values.

It is not a statement about the probability that the population mean has a certain value.

It is not a statement about the probability that the null hypothesis is true.

Type I and II error

Type I error: Reject H0 while H0 is true

If the null hypothesis is true and alpha = 0.05

- There really is no relationship and the extremity of the test statistic is due to chance.
- About 5% of all samples from this population will lead us to wrongly reject chance and conclude significance.

Type II error: Fail to reject H0 while H0 is false

- This is an incorrect decision only if Ha is true.
- The probability of this incorrect decision β is computed as 1-Power(test)

One sample t test

```
ods graphics on; # requests graphical output
proc ttest h0=80 plots(showh0) sides=u alpha=0.1;
var time;
run;
ods graphics off;
```

- h0 = 80: the value of null hypothesis
- plots(showh0) = null value be displayed on all relevant graphs.
- sides = u: grater than

if the alternative hypothesis is larger, use "sides=u".

if the alternative hypothesis is smaller, use "sides=l".

if the alternative hypothesis is not equal, use "sides=2".