DataCamp

Learning by doing

Introduction

- In this lecture, 4 tests, each compare means
  - z-test
  - t-test (single sample)
  - t-test (dependent)
  - t-test (independent)

Introduction

- z = (Observed – Expected) / SE
- t = (Observed – Expected) / SE

  - SE: Standard error

When to use z and t?

- z-test
  - When comparing a sample mean to a population mean and the standard deviation of the population is known
- Single sample t-test
  - When comparing a sample mean to a population mean and the standard deviation of the population is not known

When to use z and t?

- Dependent t-test
  - When evaluating the difference between two related samples
- Independent t-test
  - When evaluating the difference between two independent samples

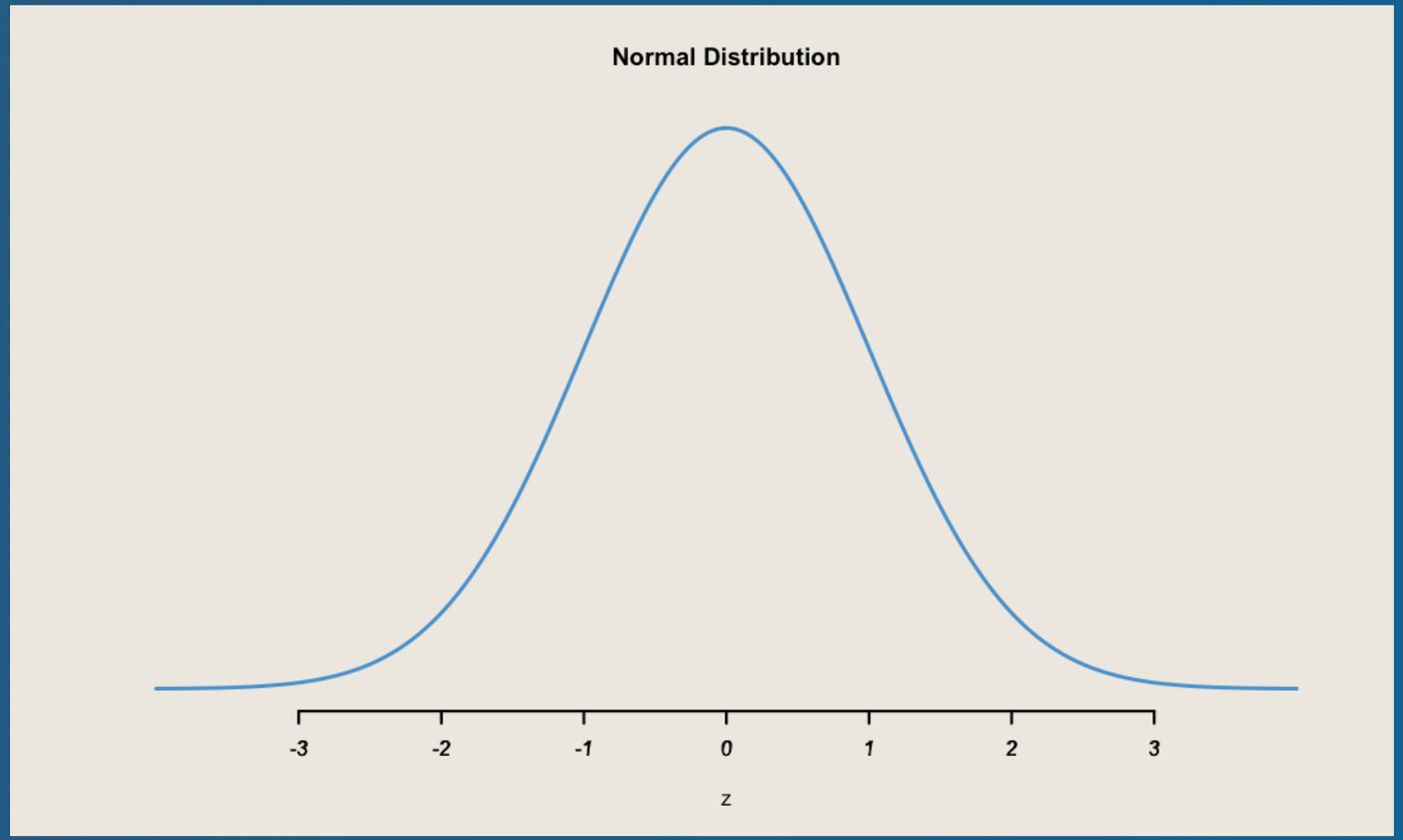
Observed, Expected, and SE

	Observed	Expected	SE
z	Sample mean	Population mean	SE of the mean
t (single sample)	Sample mean	Population mean	SE of the mean
t (dependent)	Sample mean of difference scores	Population mean of difference scores	SE of the mean difference
t (independent)	Difference between two sample means	Difference between two population means	SE of the difference between Ms

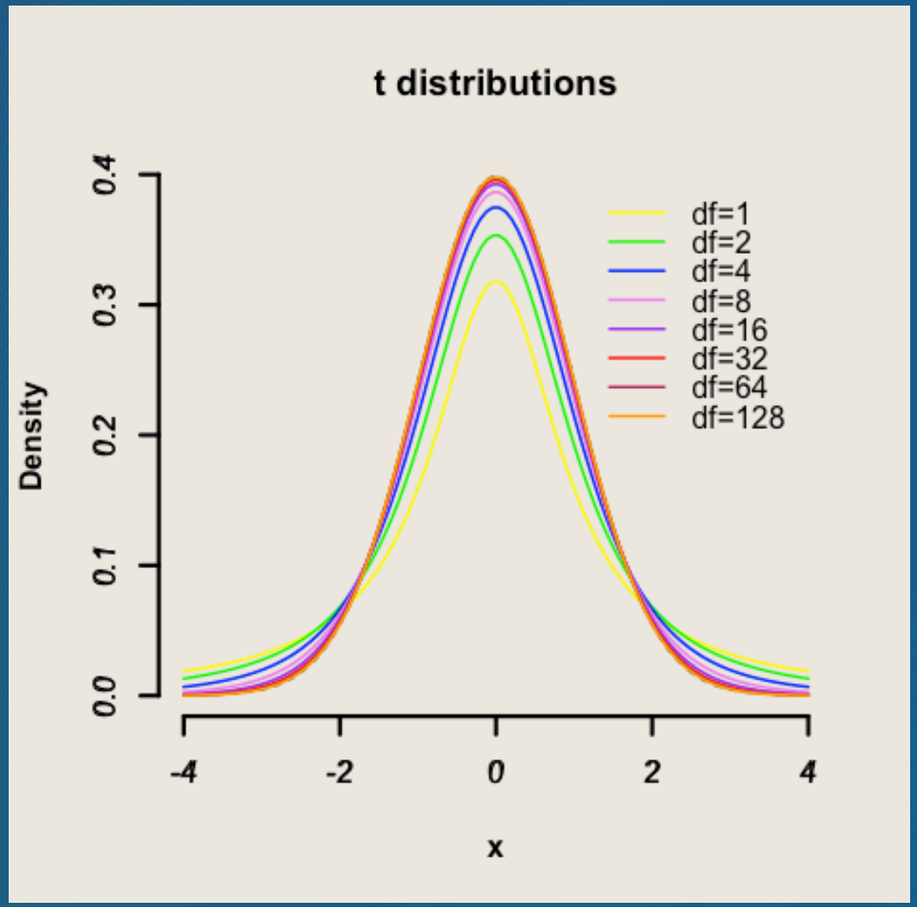
p-values for z and t

- Exact p-value depends on:
  - Directional or non-directional test
  - Degrees of freedom (df)
    - Different t-distributions for different sample sizes

z distribution



Family of t distributions



Degrees of freedom (df)

	df
z	NA
t (single sample)	N-1
t (dependent)	N-1
t (independent)	(N1 – 1) + (N2 – 1)

Segment summary

- z = (Observed – Expected) / SE
- t = (Observed – Expected) / SE

  – SE: Standard error

Dependent t-test

- Also known as paired samples t-test
  - Appropriate when the same subjects are being compared
    - For example, pre/post design
  - Or when two samples are matched at the level of individual subjects
    - Allowing for a difference score to be calculated

Dependent t-test

- A thorough analysis will include
  - t-value
  - p-value
  - Cohen's d (effect size)
  - Confidence interval (interval estimate)

Dependent t-test

- t-value
  - t = (Observed – Expected) / SE
  - t = (M – 0) / SE = M / SE

Dependent t-test

- p-value
  - Based on t-value and the t-distribution
  - Directional or non-directional test

Dependent t-test

- Cohen's d
  - d = M / SD

Dependent t-test

- Confidence interval
  - Upper bound = M + t (SE)
  - Lower bound = M – t (SE)

  - t-value depends on level of confidence and t-distribution