

Hypothesis testing: errors

Instructions

For each of the following problems,

- (a) State null and alternative hypotheses appropriate to the situation
- (b) Describe what a type I and type II error would look like.

Problem 1

A smart phone manufacturer claims that their devices have a mean charge time of 35 minutes. A consumer group suspects it's longer. They collect a sample of size 89 to test the claim.

Answer:

(a) Null & Alternative Hypotheses

Null Hypotheses (H_0): The average charging time for the manufacturer's smartphones is 35 minutes. (This is the manufacturer's claim)

Alternative Hypotheses (H_1): The average charging time for the manufacturer's smartphones is different from 35 minutes. (This is what the consumer group suspects)

(b) Type I & Type II Errors

Type I Error: We reject the null hypothesis (H_0) when it's actually true. In this case, we would conclude that the average charging time is different from 35 minutes, when in reality it actually is 35 minutes on average.

Type II Error: We accept the null hypothesis (H_0) when it's actually false. Here, we would conclude that the average charging time is 35 minutes, when it's actually longer or shorter than that.

Problem 2

The NBA advertises that the average length of their games is 131 minutes. A fan times 25 games to see if this claim is reasonable.

Answer:

(a) Null & Alternative Hypotheses

Null Hypotheses (H_0): The average length of NBA games is 131 minutes. (This is the NBA's advertised claim)

Alternative Hypotheses (H_1): The average length of NBA games is different from 131 minutes. (The fan suspects games are either longer or shorter)

(b) Type I & Type II Errors

Type I Error: We reject the null hypothesis (H_0) when it's actually true. In this case, we would conclude that the average game length is different from 131 minutes, when all games are actually 131 minutes long on average.

Type II Error: We fail to reject the null hypothesis (H_0) when it's actually false. Here, we would conclude that the average game length is 131 minutes, when games are actually longer or shorter than that on average.