

Statistical Inference Theory

Lesson 30

Statistical Hypotheses

1. Statistical Hypotheses for μ .

30.1 - Problem 1:

The claim is that it takes 20 minutes on average to change the oil. Therefore, $H_0: \mu = 20$.

Since there no challenge to this claim, it is reasonable to assume $H_a: \mu \neq 20$.

30.1 - Problem 2:

There is a bias in this claim: $H_0: \mu \geq 10$.

Therefore, the counter-claim is $H_a: \mu < 10$.

30.1 - Problem: 3:

For the null hypothesis, μ has to be set equal to a specific value. Therefore, the counter claim is used as $H_0: \mu \leq 20$ and the claim is used as $H_a: \mu > 20$.

Supplementary Problems

1.

At most 150°F means $\mu \leq 150$. Therefore, $H_0: \mu \leq 150$. The counter-claim is the discharged water is more than 150°F. Therefore, $H_a: \mu > 150$.

2.

Since the claim is that the average is 15.20 minutes per call, $\mu = 15.20$. Therefore, $H_0: \mu = 15.20$. The counter-claim is the average is not equal to 15.20 minutes per call. Therefore, $H_a: \mu \neq 15.20$.

3.

We start by assuming the null hypothesis that there has been no change in the monthly average maintenance costs. This way we can set μ to a specific value. Therefore, $H_0: \mu = \$75$ (or $\mu \leq \$75$). The counter-claim would be that the mean monthly maintenance cost has increased. Therefore,

$H_a: \mu > \$75$.

4.

The claim "contains no more than 25% fat" means the average fat is at most 25%. Using this as our claim, $H_0: \mu \leq 25$ (or $\mu = 25$). The counter-claim is "there is more than 25% fat". $H_a: \mu > 25$.

5.

Since the foundry desires to produce iron casking with an average weight of 20 lbs, we make the claim $H_0: \mu = 20$.

Since 20 lbs is the standard to determine whether the production is operating satisfactorily, $H_a: \mu \neq 20$.

6.

The claim is that the average age is 36 years. Therefore, $H_0: \mu = 36$.

The counter-claim is that the average age is not 36 years. Therefore, $H_a: \mu \neq 36$.

7.

We will make the claim that the mean fill per bottle is 355 ml. Therefore, $H_0: \mu = 355$.

The counter-claim is that the mean fill per bottle is not equal to 355 ml. Therefore, $H_a: \mu \neq 355$.

8.

We make the claim $\mu = \$5,000$ or less. Therefore, $H_0: \mu \leq \$5,000$.

The counter-claim is the average family income is \$6,000 or more. Therefore, $H_a: \mu \geq \$6,000$.

9.

Important: The result of a sample should in no way determine H_0 and H_a . In fact H_0 and H_a must be determined before the sample is taken. Since the maximum allowable radiation level of drinking water is 15 pCi/l, we make the claim $H_0: \mu \leq 15$ and the counter-claim is $H_a: \mu > 15$.

10.

Important: The result of a sample should in no way determine H_0 and H_a . In fact H_0 and H_a must be determined before the sample is taken.

Since the soda manufacturer is concerned with overflow, we make the counter-claim $H_a: \mu > 12$.

Therefore, the claim is $H_0: \mu \leq 12$ (or $\mu = 12$).

11.

Since the mean of the diameters of the corks is 0.3, we make the claim $H_0: \mu = 0.3$.

Deviation from this mean is the counter-claim and therefore, $H_a: \mu \neq 0.3$.
