Statistical Hypothesis: – a conjecture about a population parameter. This conjecture may or may not be true.

Hypothesis testing:- or significance testing is a method for testing a claim or hypothesis about a parameter in a population, using data measured in a sample. In this method, we test some hypothesis by determining the

likelihood that a sample statistic could have been selected, if the hypothesis

regarding the population parameter were true.

There are two types of statistical hypotheses:

We have to decide between two hypotheses regarding one or more parameter, the two hypotheses are :-

**Null Hypothesis (H0)** – a statistical hypothesis that states that there is no difference between a parameter and a specific value, or that there is no difference between two parameters.

**Alternative Hypothesis (H1)** – a statistical hypothesis that states the existence of a difference between a parameter and a specific value, or states that there is a difference between two

FOUR STEPS TO HYPOTHESIS TESTING

Step 1: State the hypotheses.

Step 2: Set the criteria for a decision.

Step 3: Compute the test statistic.

Step 4: Make a decision.

**Note**: H0 will ALWAYS have an equal sign (and possibly a less

than or greater than symbol, depending on the alternative

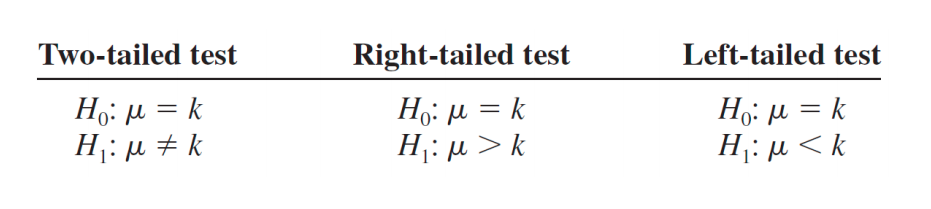
hypothesis). The alternative hypothesis has a range of values

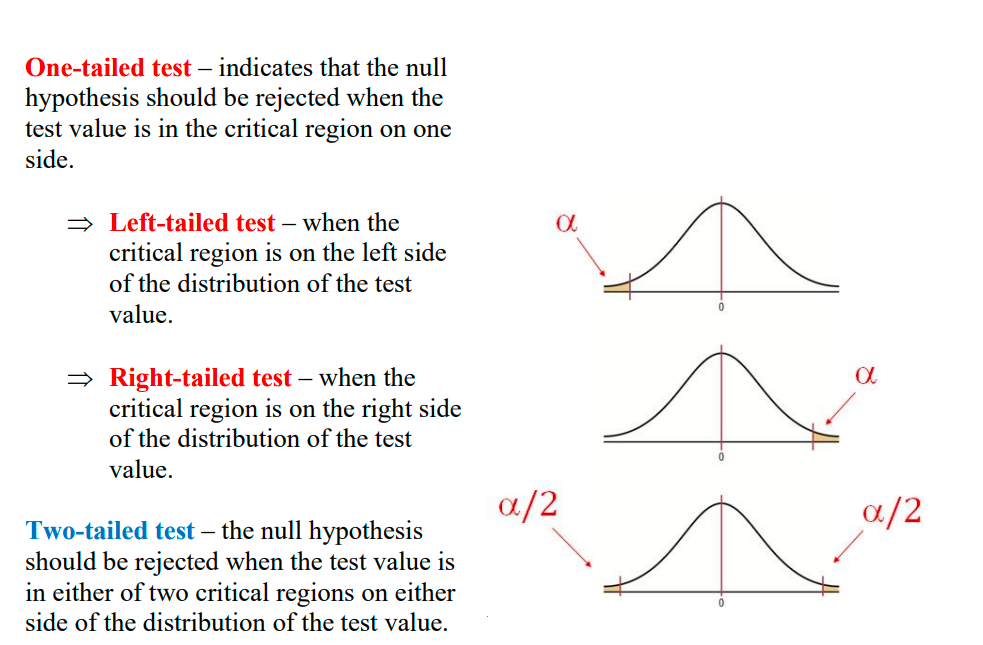
that are alternatives to the one in .

* The null and alternative hypotheses are stated together. The

following are typical hypothesis for means, where k is a specified

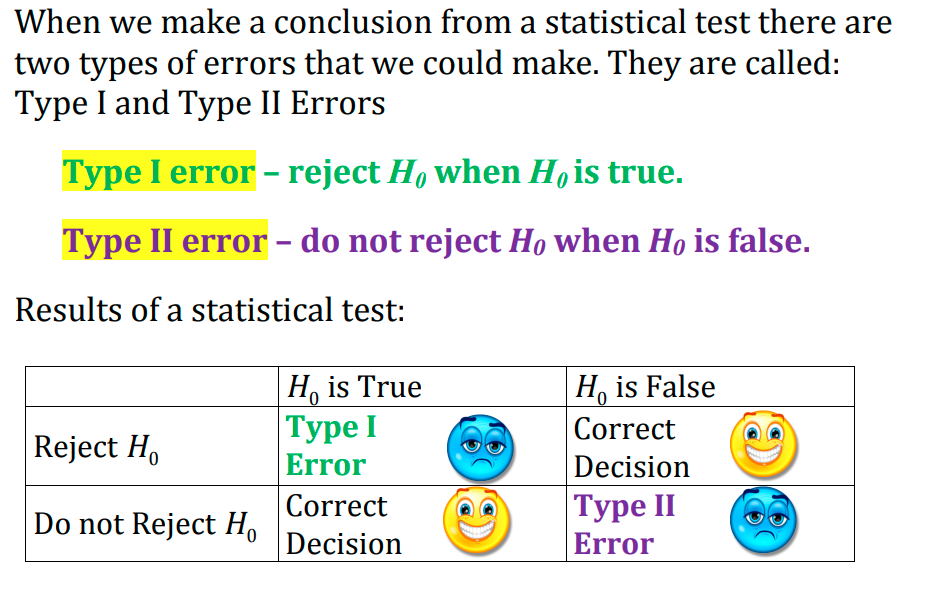
number.





Examples: State the H0 and H1 for each case. A researcher thinks that if pregnant mothers use vitamins, the birth weight of the babies will increase. The average birth weight of the population is 8.6 pounds.

H0: = 8.6 H1: M > 8.6



**Testing a hypothesis about the mean of a population:**

- We have the following steps:

1.Data: determine variable, sample size (n), sample mean( ) , population standard deviation or sample standard deviation (s) if is unknown

2. Assumptions :We have two cases:

- **Case1:** Population is normally or approximately normally distributed with known or unknown variance (sample size n may be small or large),

**-Case 2:** Population is not normal with known or unknown variance (n is large i.e. n≥30)

**3.Hypothesis:**

we have three cases

* **Case I** :

H0: μ=μ0

H1: μ μ0

* e.g. we want to test that the population mean is

different than 50

* **Case II** :

H0: μ = μ0

H1: μ > μ0

* e.g. we want to test that the population mean is greater

than 50

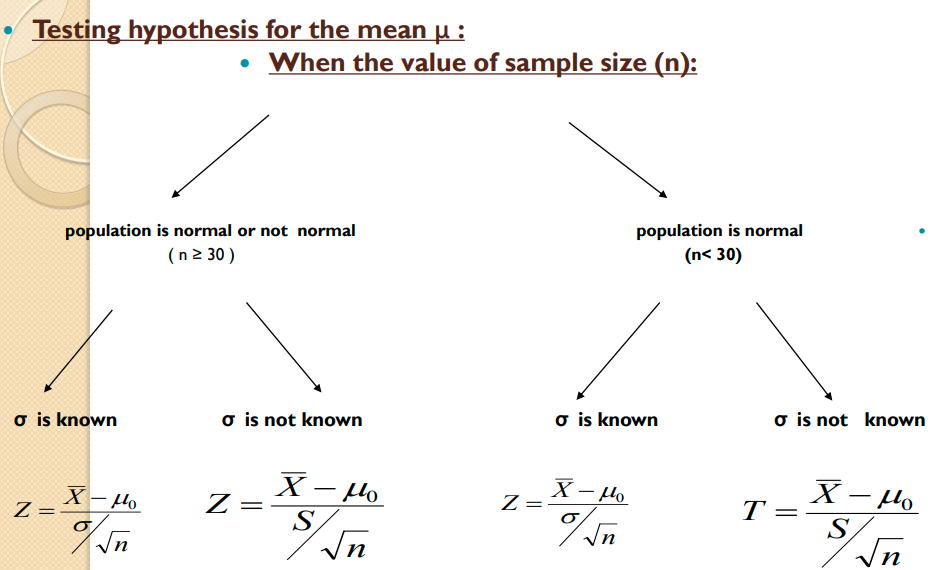
* **Case III** :

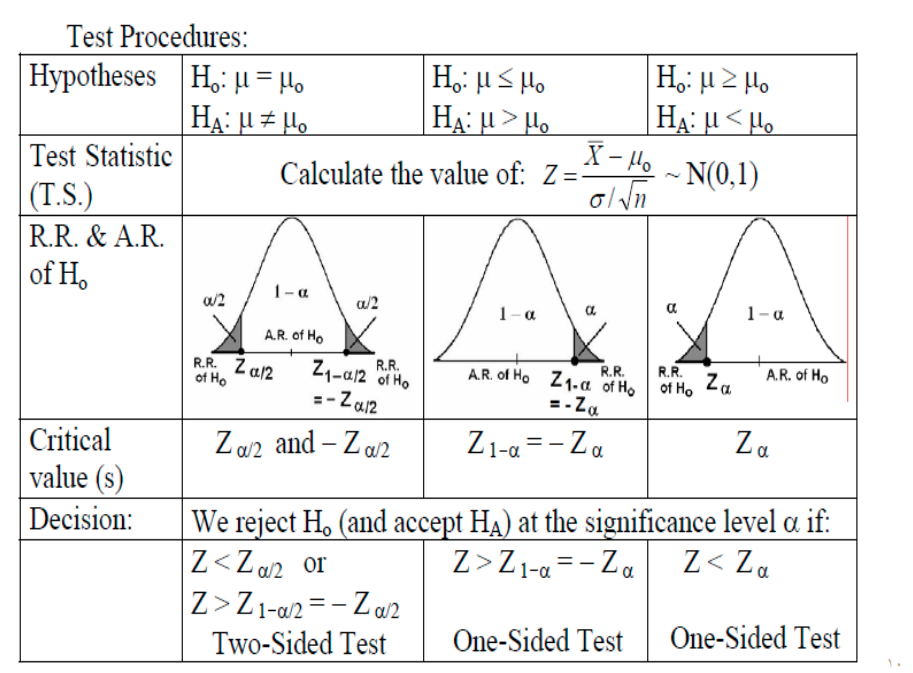
H0: μ = μ0

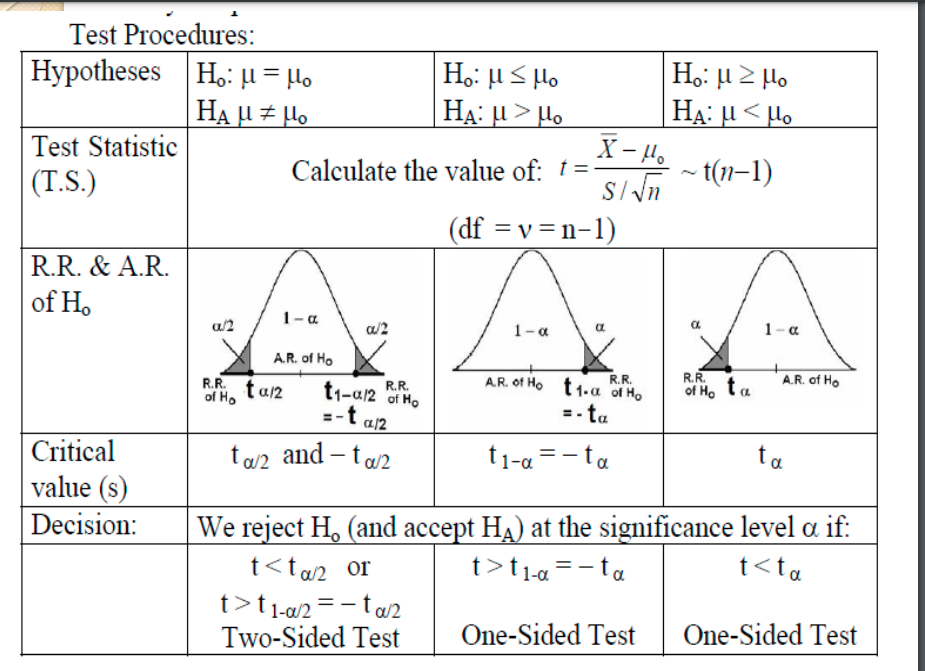
H1: μ< μ0

* e.g. we want to test that the population mean is less

than 50

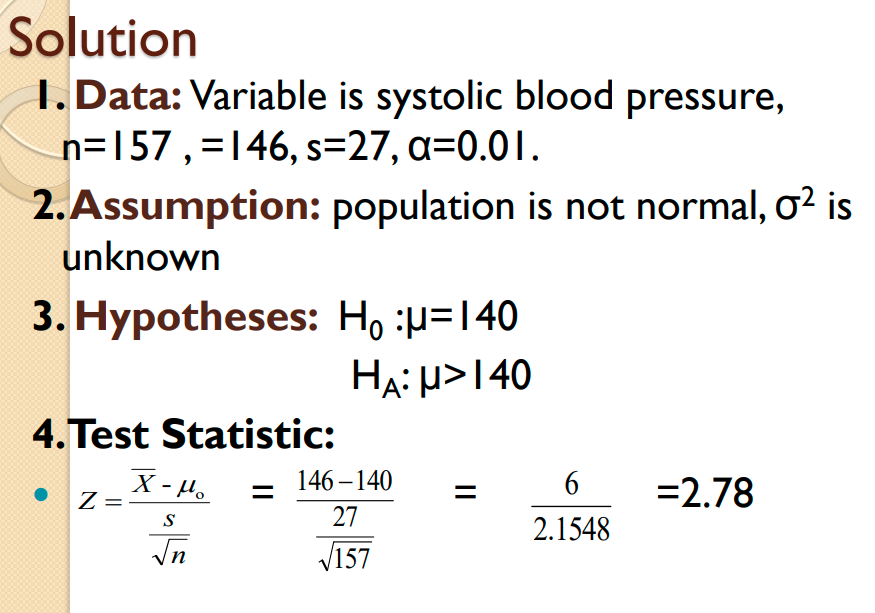


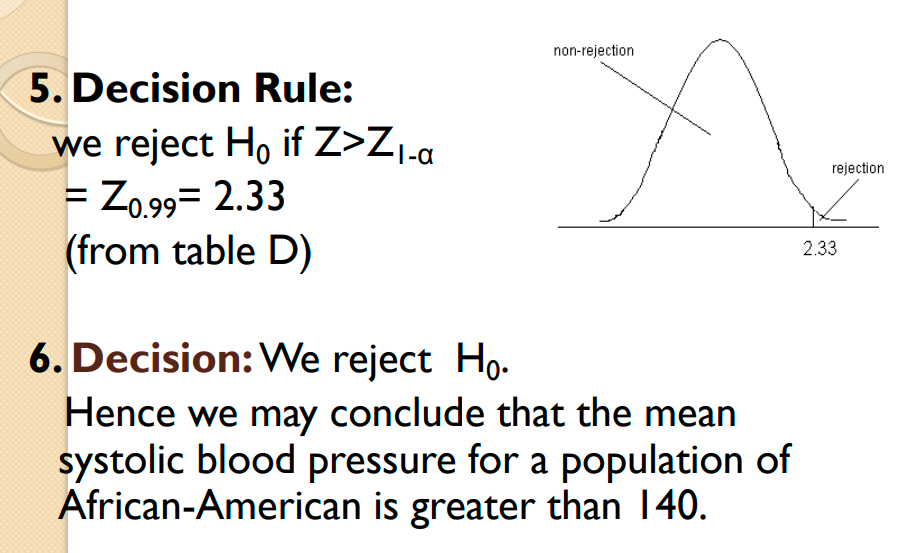




Example//

Among 157 African-American men ,the mean systolic blood pressure was 146 mm Hg with a standard deviation of 27. We wish to know if on the basis of these data, we may conclude that the mean systolic blood pressure for a population of African-American is greater than 140. Use α=0.01.





Example// Researchers are interested in the mean age of a certain population. A random sample of 10 individuals drawn from the population of interest has a mean of 27. Assuming that the population is approximately normally distributed with variance 20,can we conclude that the mean is different from 30 years ? (α=0.05) .

-Data: variable is age, n=10,m =27 ,σ2=20,α=0.05

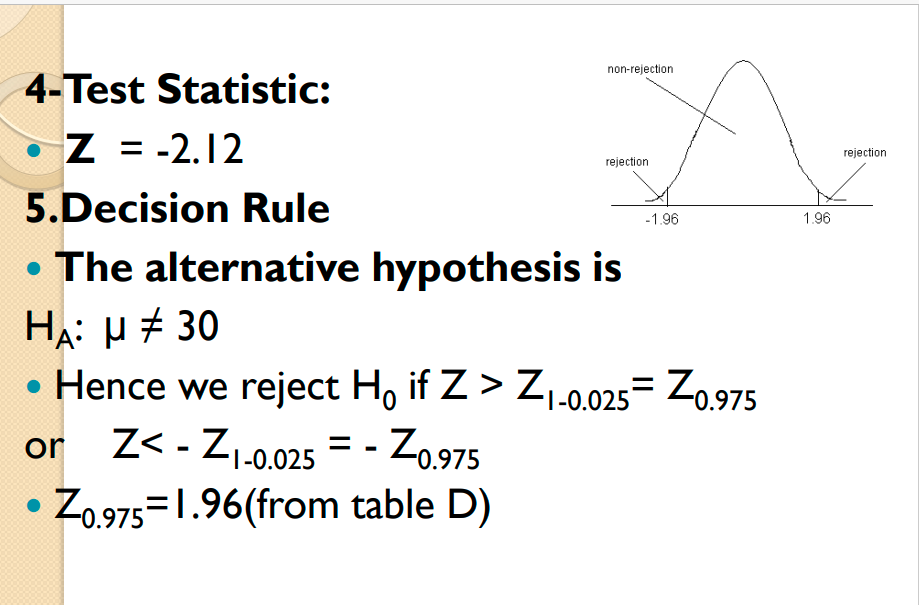
2-Assumptions: the population is approximately

normally distributed with variance 20

3-Hypotheses:

 H0 : μ=30

 H1: μ 30



6.Decision:

 We reject H0

,since -2.12 is in the

rejection region .

 We can conclude that μ is not equal to 30