Dr. Rajesh Verma. Assistant professor and Head. U.G. Department of Zoology. D.k. college Dumraon (Buxar). Notes for B.sc part 1st. paper 2 (A).

Question :- Write notes on DIFFERENCE BETWEEN SAMPLE ?

Answers:- Difference Between Means : Theory

The size of each population is large relative to the sample drawn from the population. The set of differences between sample means is normally distributed. This will be true if each population is normal or if the sample size are large.

Difference Between Means :-

Statistics problems often involve comparisons between two independent sample means. This lesson explains how to compute probabilities associated with differences between means.

Difference Between Means : Theory

Suppose we have two populations with means equal to μ_1 and μ_2 :

Date 23.04.020

suppose further that we take all possible samples of size n_1 and n_2. And finally, suppose that the following are valid:

- The size of each populations is large relative to the sample drawn from the population. That is N_1 is large relative to N_2 is large relative to n_2. (In this context, populations are considered to be large if they are at least 20 times bigger than their sample.)

- The samples are independent; that is, observations in population 1 are not affected by observations in population 2, and vice versa.

Give these assumptions, we know the following.

- The expected value of the difference between all possible sample means is equal to the difference between population means. Thus,

$$E(\bar{x}_1 - \bar{x}_2) = \mu_0 = \mu_1 - \mu_2$$

if the populations N_1 and N_2 are both large relative to n_1 and n_2, Date - 23.05.2020

respectively, then

$$\sigma^2 \bar{x}_1 = \sigma^2_1 / n_1$$

$$\sigma^2 \bar{x}_2 = \sigma^2_2 / n_2$$

$$\sigma_d^2 = \sigma_1^2 / n_1 + \sigma_2^2 / n_2$$

$$\sigma_d = \text{sqrt} (\sigma_1^2 / n_1 + \sigma_2^2 / n_2)$$

Difference of means test (t-test):-

The significance of differences between a sample mean and a (perhaps hypothetical) "true" mean, or between two sample means, can be assessed using the t-statistic calculated as part of the t-test. The t-statistic may be thought of as a scaled difference between the two means, where the absolute difference between mean is rescaled using and estimate of the variability of the means. The reference distribution for the t-statistic is the t-distribution. shape of which varies slightly as a function of sample size for $n < 30$, and strongly resembles the normal distribution in its shape.

The one-sample t-statistic is

$$t = \frac{\bar{x} - \mu}{\sigma \bar{x}}$$

Where $\bar{x}$ is the sample mean, μ is the true or hypothetized mean, s is the sample standard deviation, and n is the sample size. The specific t-distribution that serves as the reference distribution for the t-statistic depends on the "degrees of freedom" (d) of

The two-sample t-statistic is

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sigma \bar{x}_1 - \bar{x}_2}$$

Where $\bar{X}_1$ and $\bar{X}_2$ are the means of the two samples, and $\sigma \bar{x}_1 - \bar{x}_2$ is a measure of the varibility of the differences between the samples means. When the population variances are assumed to be equal, a pooled variance estimate is calculated as the weighted average (by sample size) of the two sample variances.

$$\sigma^2 pooled = \frac{s_1^2 (n_1 - 1) + s_2^2 (n_2 - 1)}{n_1 + n_2 - 2}$$

and then

$$\sigma \bar{x}_1 - \bar{x}_2 = (\sigma^2 pooled)^{0.5} ((1/n_1) + (1/n_2))^{0.5}.$$