Frequently Asked Questions

1. Define an estimate.

Answer:

An estimate is an indication of the value of an unknown quantity based on observed data.
More formally, an estimate is the particular value of an estimator that is obtained from a particular sample of data and used to indicate the value of a parameter.
When we have observed a specific value of our estimator we call that value an estimate. In other words an estimate is a specific observed value of a statistic

2. Name two types of estimates.

Answer:

We can make two types of estimates about the population. Point Estimate and Interval Estimate.

A point estimate of a population parameter is a single value of a statistic. For example, the sample mean is a point estimate of the population mean μ. Similarly, the sample proportion *p* is a point estimate of the population proportion *P*. A point estimate is a single number that is used to estimate an unknown parameter.

Interval estimate: An interval estimate is defined by two numbers, between which a population parameter is said to lie. For example, $a < x < b$ is an interval estimate of the population mean μ. It indicates that the population mean is greater than *a* but less than *b*.

3. What do you mean by an unbiased estimate? Explain

Answer:

The expected value (mean) of the estimate's sampling distribution is equal to the underlying population parameter; that is, there is no upward or downward bias. An estimate $\hat{\theta}$ of a parameter θ is said to be unbiased if $E(\hat{\theta}) = \theta$. Hence any estimate is said to be unbiased if the average value of the estimated population parameter is equal to the actual value of the parameter.

Unbiased estimators determine the tendency, on the average, for the statistics to assume values close to the parameter of interest.

4. Explain briefly consistent estimates

Answer:

Larger sample sizes tend to produce more accurate estimates; that is, the sample parameter converges on the population parameter. An estimate is a consistent estimate of a population parameter if as the sample size increases it becomes almost certain that the value of statistic comes very close to the value of the population parameter. If an estimate is consistent it becomes more reliable with large samples
The values of sample mean and sample proportions are consistent estimates, since from their formulas as **n** get big, the standard errors gets small.

5. State the difference between point estimates and interval estimates

Answer:

A point estimate is one particular value that is used to estimate the underlying population parameter. For example, the sample mean is essentially a point estimate of a population mean. However, because of the presence of sampling error, sometimes it is more useful to start with this point estimate, and then establish a range of values both above and below the point estimate. Next, by using the probability-numbers characteristic of normally distributed variables, we can state the level of confidence we have that the actual population mean will fall somewhere in our range. This process is known as "constructing a confidence interval". A point estimate is often insufficient, because it is either right or wrong. If you are told only that her point estimate of enrolment is wrong, you do not know how wrong it is, and you cannot be certain of the estimates reliability. If you learn that it is off by only 10 students you would accept 350 students as a good estimate of future enrolment. Therefore point estimate is much more useful if it is accompanied by an estimate of the error that might be involved.An interval estimate is a range of value used to estimate a population parameter. It indicates an error in two ways.1) by the extent of its range and 2) The probability of the true population parameter lying within the range.

6. Write a note on efficiency of an estimate.

Answer:

While there are many unbiased estimates for the same parameter of the population, the most efficient has a sampling distribution with the smallest variance. Our aim is to get such an estimate which has the least standard error. An estimate with least standard error is said to be an efficient estimate of the population parameter.

7. What do you mean by bias in the estimate?

Answer:

When the estimated value of the parameter lies away from the actual value of the parameter there exists bias in the estimate. The samples selected and the nature, size of the samples may be the reasons for getting the biased estimates. Bias in the estimate can be measured as the difference between the actual value of the parameter to be estimated and the estimated value of the parameter.

8. Write a note on biased estimates

Answer:

A point estimate $\hat{\theta}$ for a parameter θ is said to be unbiased if

$E(\hat{\theta}) = \theta$

If a point estimate $\hat{\theta}$ is not unbiased, then $E(\hat{\theta}) \neq \theta$;

the estimate $\hat{\theta}$ is biased .

Then its bias is defined to be bias $= E(\hat{\theta}) - \theta$

Therefore Bias $(\hat{\theta}) = E(\hat{\theta}) - \theta$

Then the estimated value is not close to the actual value of the parameter.

9. Give some examples for the estimates of the population

Answer:

Population in which we are interested	**Population parameter we wish to estimate**	**Estimate we make**
Employees in a furniture factory	Mean turnover per year	8.9% turnover per year
Applicants for town manager of chapel hill	Mean formal education (years)	17.9 year of formal education
Teenagers in a given community	Proportion who have criminal records	2% have criminal records

10. Briefly explain the situations where we make use of estimates.

Answer

When you are ready to cross a street, you estimated the speed of any car that is approaching, the distance between you and that car, and your own speed. Having made these quick estimates you decide whether to wait, walk or run.

All managers must make quick estimates too. The outcome of these estimates may affect their organizations as seriously as the outcome of your decision as to whether to cross the street.

University departments must make estimates of next fall's enrolment in Statistics.

Credit manager will estimate whether a purchaser will eventually pay his bills.

Prospective home buyers make estimates concerning the behaviour of interest rates in the mortgage market.

All these people make estimates without worry about whether they are scientific but with the hope that the estimates bear a reasonable resemblance to the outcome.

11. What do you mean by precision of an estimate?

Answer:

We can say that we have obtained a more précised estimate if the estimate has the variance less than variance of any other estimates. Let and ' be two unbiased estimates for the parameter θ then is said to be more efficient (more précised) than ' if V( ) < V(').

12. List some point estimates of population parameters

Answer:

From the sample, a value is calculated which serves as a point estimate for the population parameter of interest.

a) The best estimate of the population **percentage**, $_{P}$, is the sample percentage, P.

b) The best estimate of the unknown population **mean**, , is the sample mean, . This estimate of ④ is often written and referred to as 'mue hat'.
c) The best estimate of the unknown population **standard deviation**, , is the sample standard deviation s, where:

13. Distinguish between accuracy and precision of estimates.

Answer:

Due to the difficulty of ensuring that no unsuspected bias enters into estimates we will usually speak of the precision of the value of an estimator instead of the accuracy. Accuracy refers to the size of the deviation from the true mean μ whereas precision refers to the size of the deviations from the (estimated) mean $\acute{y}$ obtained by repeated applications of the sampling procedure.

14. How do you estimate the Mean Square error of an estimator?

Answer:

In order to compare a biased estimate with an unbiased estimate or two estimates with different amounts of bias, a useful criterion is the Mean Square Error (M.S.E) of the estimator measured from the population value that is being estimated. Hence Mean Square Error is an average of the squared deviations of actual value of the parameter from its estimated value

$$M.S.E\ (\) = E\ (\ -\ \mu)^2$$

15. State whether the following statements are true or false.

I. The standard error is estimated solely from sample attributes.
II. The standard error is a measure of central tendency.

Answer:

I. False: The Standard Error cannot be estimated solely from the sample attributes. The standard error can be computed from knowledge of sample attributes - sample size and sample statistics.
II. False: The standard error is a measure of variability, *not* a measure of central tendency.