SEMBIT433

Applying central limit theorem and confidence intervals

Overview

This standard covers the competencies required for applying central limit theorem and confidence intervals to a project. It involves demonstrating how central limit theorem can be utilised to estimate the mean of a population when it is not normally distributed. You will be required to calculate confidence intervals from the standard confidence interval equations, which will include mean, standard deviation, process capability Cp, and its index Cpk. You will be expected to demonstrate how sample size affects the accuracy of the mean. You will also be expected to produce a report highlighting the findings and an action plan identifying how the improvements can be implemented.

Your responsibilities will require you to comply with organisational policy and procedures for the activities undertaken and to report any problems with the activities that you cannot solve or are outside your responsibility to the relevant authority. You will need to ensure that all the necessary calculations and documentation is completed accurately and legibly. You will be expected to take full responsibility for your own actions within the activity and for the quality and accuracy of the work that you produce.

Your underpinning knowledge will provide a good understanding of central limit theorem and confidence intervals and provide an informed approach to the techniques and procedures used. You will need to understand the principles and application of central limit theorem and confidence intervals in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying safe working practices will be a key issue throughout.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. use central limit theorem to estimate the mean of a population when it is not normally distributed
3. calculate confidence intervals from the standard confidence interval equations
4. use sample size to demonstrate the effect it has on the accuracy of the mean
5. produce a report highlighting the findings
6. produce an action plan to ensure the improvements are implemented

Knowledge and understanding

You need to know and understand:

1. how to work safely at all times, complying with health and safety and other relevant regulations and guidelines
2. what the central limit theorem is
3. what is meant by the standard error of the mean
4. how the central limit theorem can be used to reduce measurement error
5. the number of observations that must be made in order to estimate a population mean when the data is not normally distributed
6. how to calculate the standard error of the mean
7. the relationship between the standard error of the means and sample size
8. how to utilise central limit theorem to reduce measurement system error
9. how to calculate mean, median, mode, standard deviation, range, variance, Cp and Cpk
10. how to calculate confidence intervals from the standard confidence interval equations
11. the 'mean of means' principle
12. the extent of your own authority within the activity and whom you should report to, in the event of problems that you cannot resolve

Scope/range related to performance criteria