STAT353 COURSEWORK

This coursework contributes 30% towards your final mark for the course.

The **aims** of this coursework are to test your abilities in

- research
- summarising key concepts
- calculating and interpreting appropriate statistics
- report writing

You will be **assessed** on

- relevance and accuracy of calculations
- interpretation of results
- relevance and breadth of summary

You can work either individually or in groups of two. In the latter case the choice of the partner is left up to you. Make sure that you mark clearly the names of both members of the team on the front page of the project if you choose this option.

You are employed as a production engineer by Acme Engineering Ltd which, amongst other things, makes terminal blocks. The critical dimension is the width of a slot on the block which has specification limits of 0.8735 cm to 0.8795 cm. The company is intending to introduce Statistical Process Control (SPC) and the production manager asks you to prepare a brief summary of what SPC is, how it works and what the advantages are. He would also like a simple explanation of the capability indexes C_p and C_{pk} which Acme are also introducing.

To provide an example for your report, you arrange for the collection of some test data. Random samples of 5 terminal blocks are taken, after the slots have been milled, every hour for two consecutive eight-hour shifts. The resulting measurements of slot width are attached. (Note, for example, that the first coded value of 772 corresponds to a slot width of 0.8772 cm.)

The next day you receive a memo from the managing director:

> *'I understand you are preparing a report on SPC. While you're about it, find out what you can about 'Six Sigma'. I've been reading some other companies' reports recently which are enthusing about this new approach to quality that's saving them huge amounts of money. Write a short report for me on what it's all about. Also, I keep reading reference to aiming at defect rates of no more than 3.4 parts per million with Six Sigma. Try and find out where this mysterious number comes from. I've done some statistics – standard deviations and normal distributions, for example – so you needn't spare the details. Have it all on my desk by 9am, 28th November?*

Required

1. A word-processed report on SPC covering no more than two sides of A4 plus an appendix showing your illustrative calculations and interpretation. Either use Minitab for any graphs and calculations, or do them by hand.

2. A word-processed report on Six Sigma covering no more than two sides of A4 plus an appendix showing where the '3.4 parts per million' comes form.

3. Express yourselves clearly and concisely. Unnecessarily lengthy explanations may reduce your mark.

Deadline

Friday 28th November, 9am. Post in the STAT353 coursework box in the Mathematics and Statistics Student Reception. Please remember that late coursework scores zero. Fill out an Extenuating Circumstances form if there is a good reason.

DATA SHEET

Product	Terminal Block	Dept. No.	78	Order No.	54321
Characteristic	Hole diameter	Spec. Limits	0.8795cm Max 0.8735cm Min		
Unit of Measurement	0.0001cm over 0.8000 (thus, 0.8772 becomes 772)				

	Measurements on each of 5 items				
Time produced	a	b	c	d	e
0600	772	804	779	719	777
0700	756	787	733	742	734
0800	756	773	722	760	745
0900	744	780	754	774	774
1000	802	726	748	758	744
1100	783	807	791	762	757
1200	747	766	753	758	767
1300	788	750	784	769	762
1400	757	747	741	746	747
1500	713	730	710	705	727
1600	716	730	752	735	751
1700	746	727	763	734	730
1800	749	762	778	787	771
1900	771	767	785	772	765
2000	771	758	769	770	771
2100	767	769	770	794	786