2006 SIX SIGMA – TEST I

Time: 60 minutes, Max marks:20

Use of approved Six Sigma Tables is permitted. Choose a significance level 0.05, where not mentioned.

1) Explain the role and training of a Six Sigma Black Belt.

(3 marks)

2) Discuss the tools to be used for improvement vis a vis the Sigma levels.

(2 marks)

3) A batch of raw material was tested for tensile strength with the following values:

Tensile strength	18.4	32.6	35.3	31.7	30	32.3	31.7	25	32.8	21.5
	28.4	39.9	35	28.3	29.4	24.2	33.8	32.1	27.5	26.3
	42.8	31	30	34.5	26.4	31.3	29.4	23.2	26	20.8

Construct a modified box plot. What can you conclude from the plot?

(5 marks)

4) A Six Sigma team measured the waiting times of 15 customers at an Insurance Company office as detailed below. Construct a normal probability plot on ordinary graph paper. Are the values normally distributed?

5.1	11.3	33.2	7.6	48.6	7.5	14.9	55.1
5.3	76.4	34.1	10.3	19.4	16.2	14	

(5 marks)

5) The marks of 10 randomly sampled students in a school are:

42	48	48	58	71	65	59	56	51	50

What is the probability that the standard deviation of marks of all students in the school will be greater than 6.384?

(5 marks)

6) A scientist has invented a new additive for petrol. The old petrol gave a mileage of 65km/l with a standard deviation of 5km/l. A sample of 8 bikes were tested with the new petrol (with additive) and the results are as follows:

69	65	68	64	72	64	70	71

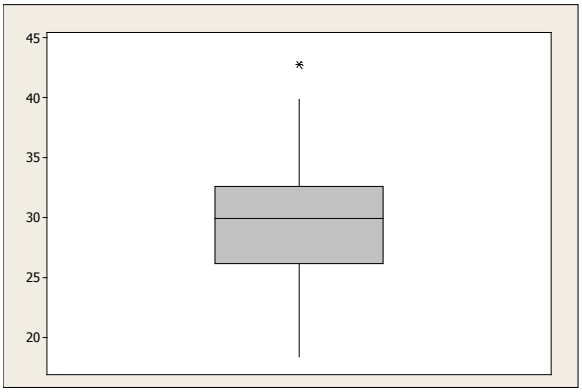
Does the new additive improve the mileage significantly?

(5 marks)

SOLUTIONS TO NUMERICAL PROBLEMS:

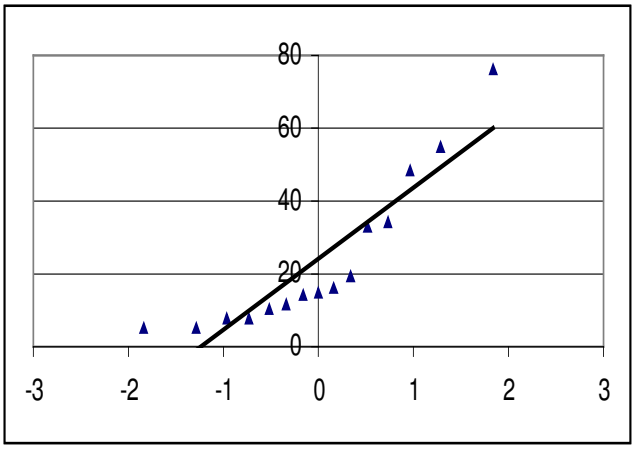
3.

Median	30
Lower quar	26.3
Upper quar	32.6
IQR	6.3
1.5IQR	9.45
Max	42.05
Min	16.85
Outlier	42.8



4.

x(j)	j	(j-0.5)/n	z
5.1	1	0.033333	-1.833914
5.3	2	0.1	-1.281551
7.5	3	0.166667	-0.96742
7.6	4	0.233333	-0.727913
10.3	5	0.3	-0.524401
11.3	6	0.366667	-0.340694
14	7	0.433333	-0.167894
14.9	8	0.5	0
16.2	9	0.566667	0.167894
19.4	10	0.633333	0.340694
33.2	11	0.7	0.524401
34.1	12	0.766667	0.727913
48.6	13	0.833333	0.96742
55.1	14	0.9	1.281551
76.4	15	0.966667	1.833914



Not normal

5.

$s = 8.753412$

$$\frac{(n-1)s^2}{\sigma^2} = \frac{10 * 8.753412^2}{6.384^2} = 16.92043$$

$$\chi^2_{0.05,9} = 16.92$$

$P(\chi^2>16.92)=0.05$; $P(\sigma>6.384)=0.95$

6.

H_0: $\mu=65$

H_A: $\mu>65$

xbar=67.875

$$z_0 = \frac{\bar{x}-\mu}{\sigma/\sqrt{n}} = \frac{67.875-65}{5/\sqrt{8}} = 1.626$$

$z_{cr}=1.644$

No, the additive does not improve mileage significantly