XII. Oven temperature at Chewy Pizza restaurants was in control when these samples were taken. Construct an $\bar{x}$ chart and an R chart for this data using a 99.74% confidence interval.

Sample #	1	2	3	4	5	6	Totals
Oven Readings n = 3 N = 6 samples	405	402	398	410	391	411	
	404	404	390	402	409	409	
	397	412	388	412	400	407	
Sample Mean	402	406	392	408	400	409	2,417
Sample Range	8	10	10	10	18	4	60

ASTM Control Factors for 99.74%			
Sample Size (n)	A_2	D_3	D_4
2	1.880	0	3.267
3	1.023	0	2.575
4	0.729	0	2.282
5	0.577	0	2.115

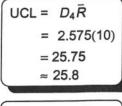$$\bar{\bar{x}} = \frac{\Sigma \bar{x}}{N} = \frac{2{,}417}{6} = 402.83 \approx 402.8$$

$$\bar{R} = \frac{\Sigma R}{N} = \frac{60}{6} = 10.0$$

$UCL = \bar{\bar{x}} + A_2\bar{R}$
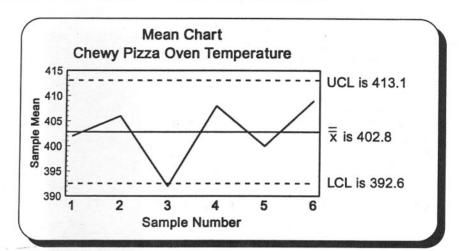$= 402.83 + 1.023(10)$
$= 402.83 + 10.23$
$= 413.06$
≈ 413.1

$LCL = \bar{\bar{x}} - A_2\bar{R}$
$= 402.83 - 1.023(10)$
$= 402.83 - 10.23$
$= 392.6$

Mean Chart
Chewy Pizza Oven Temperature

UCL is 413.1
$\bar{\bar{x}}$ is 402.8
LCL is 392.6

$UCL = D_4\bar{R}$
$= 2.575(10)$
$= 25.75$
≈ 25.8

$LCL = D_3\bar{R}$
$= 0(10)$
$= 0$

Range Chart
Chewy Pizza Oven Temperature

UCL is 25.8
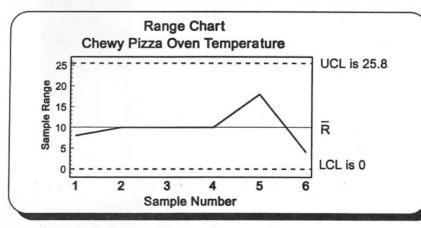$\bar{R}$
LCL is 0

XIII. Potential customers were asked to rate brand A and brand B. Little is known about the population distributions. Test at the .10 level of significance whether these brands were viewed equally by these potential customers. A paired difference sign test may be conducted even though this is not a test for statistical dependency.

Brand B was liked better by 5 of 6 customers. Sample size was n = 6. The Binomial table (ST 1) yields the following: $p(x = \geq 5) = .094 + .016 = .11$ and $(.11)(2) = .22 > .10$. The null hypothesis is accepted at the .10 level of significance. Customers rate the brands equally.

Brand Preference Test			
Potential Customer	Brand A	Brand B	Sign
1	87	89	+
2	91	97	+
3	81	85	+
4	73	81	+
5	92	98	+
6	89	81	-