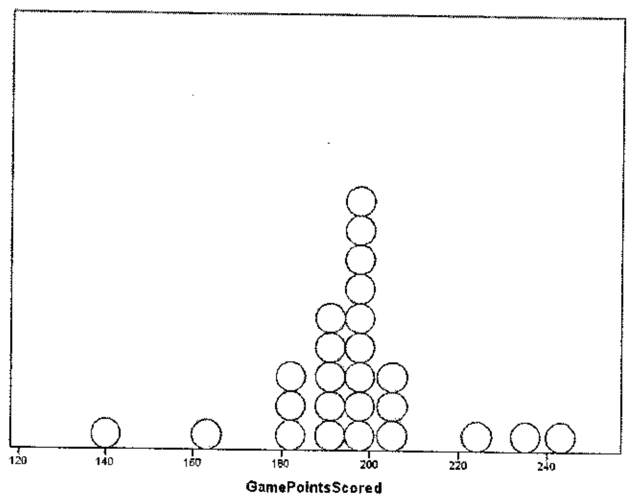
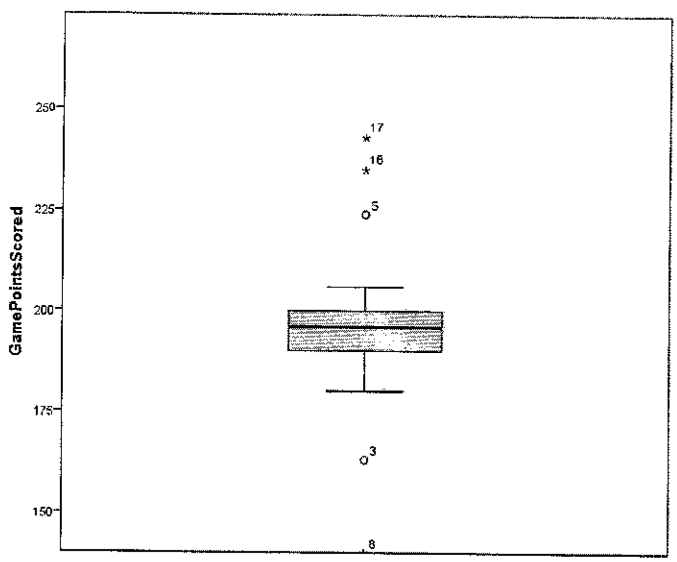
20-9 Basketball Scoring

a. μ = 183.2, This is the Null Hypothesis

b. μ > 183.2, This is the Alternative Hypothesis

c.





The mean has increased to 195.9. Though there are outliers, the distribution is symmetric, so the mean may not have been affected by them.

d.

Descriptive Statistics

	N	Minimum	Maximum	$\bar{x}$	s
GamePointsScored	25	140	243	195.88	20.272
Valid N (listwise)	25				

e. We do not know if this is a random sample (no mention – in fact it seems to have been taken from games during a specific period of time), and the sample is < 30, so it might be too small, depending on the distribution of the original data. If the original distribution is Normal, then 25 could be okay. Vague, I know. I personally would be very happy with 25. If you don't have enough data, there are ways of dealing with that by 1) using statistics created for small samples, or 2) resampling from the data set, or 3) creating data from the dataset.

f. $$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} = \frac{195.88 - 183.2}{\frac{20.27}{\sqrt{5}}} = \frac{12.68}{4.05} = 3.13$$

g. $df = n - 1 = 24$ p-value $< .005$

Notice I did not try to estimate the p-value or choose a p-value for $t > 3.13$. If your t-score/statistic is not available in the chart, use the next smallest t-statistic, in this case 2.797, and then say the p-value is < the associated value.

h. This p-value is very small.

i. Reject the null hypothesis at all of these levels. The p-value is smaller than all of them.

j. The data suggests that the rule changes impacted the game scores in a statistically significant way. However, the T.C.s (technical conditions) are not satisfied. This test can only be considered approximate and thus indefinitive.

TWO-SIDED EXAMPLE

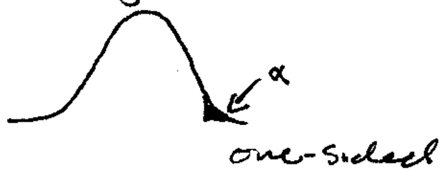
<u>20-19</u>

$n = 1818$

$\bar{x} = 22$ cigs/day

$s = 10.8$ cigs/day

notice here α is the 'critical region' value



a. 99% C.I. $\quad$ mean $\pm Z_{\alpha/2}(SE)_{\bar{x}}$

mean $\bar{x}$ =

$Z_{\alpha/2} = Z_{.005} = 2.575$

$\alpha = 1 - .99 = .01 \quad \alpha/2 = .01/2 = .005$

$(SE)_{\bar{x}} = s/\sqrt{n} = 10.8/\sqrt{1818} = .253$

C.I. $\quad \bar{x} \pm Z_{.005}\, s/\sqrt{n}$

$22 \pm 2.575(.253)$

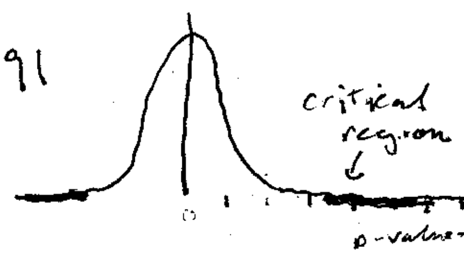
$(21.35, 24.58)$

values less than 21.35
values greater than 24.58 } would be rejected

b. 2-sided test

.05 level, so each region is .025

1. parameter of interest μ from 19.11.c $\mu = 20$
2. $H_0: \mu = 20$ $\quad$ α-level .05
   $H_A: \mu \neq 20$ $\quad$ because this is a 2-sided test, the critical regions will be .025 each.
3. T.C. $n > 30$? yes!
4. $Z = \dfrac{\bar{x} - \mu}{s/\sqrt{n}} = \dfrac{22-20}{.253} = \dfrac{2}{.253} = 7.91$



5. p-value < .0001
6. Reject H_0 at 5% level
   because p-value is < .025