$n_N \hat{p} \geq 10$ $n_N(1-\hat{p})$ $n_A \hat{p} \geq 10$ $n_A(1-\hat{p}) \geq 10$

on minitab ↓ we pooled in option

In Class Practice Review Problems

2 SRS

1. $\hat{p}_n = \frac{381}{4096} = .093$ $\hat{p}_A = \frac{8}{28} = .2857$ $N_N \geq 10 n_N$ $N_A \geq 10 n_A$

$n_A \hat{p} \not\geq 10$

$(28)(.0943) = 2.6 \not\geq 10$

$H_0: p_N = p_A$ $H_a: p_N < p_A$ $\hat{p} = \frac{381+8}{4096+28} = .0943$

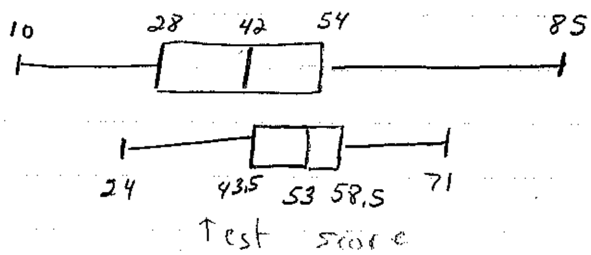
2 prop z test

$$z = \frac{\hat{p}_N - \hat{p}_A}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_N} + \frac{1}{n_A}\right)}} = \frac{.093 - .2857}{\sqrt{(.0943)(.9057)\left(\frac{1}{4096} + \frac{1}{28}\right)}} = -3.477 \sim -3.48$$

because my p-value < α level of .05 $\boxed{\text{Pvalue} = .0003}$

① Reject H_0, ② There is evidence that chromosome abnormalities are associated with increased criminality.
③ There is only a .03% chance of getting a difference in sample proportions this extreme if H_0 is true.
• Results may be inconclusive as not all assumptions were met.

2.



Control - more variable

Treatment - median score improved by about 10
3/4 of treatment scores are above median of control
∴ activities seem to help

$H_0: \mu_C = \mu_T$ $H_a: \mu_C < \mu_T$

2 sample t test

2 SRS
Both samples seem to come from Normal Pop
see graphs - no extreme outliers or skewness.

$$t = \frac{\bar{x}_C - \bar{x}_T}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{41.5 - 51.5}{\sqrt{\frac{17.1^2}{23} + \frac{11^2}{21}}} = -2.33$$

$\boxed{.02 > p > .01}$ $\boxed{p = .013}$ calc

$\bar{x}_C = 41.5$ $\bar{x}_T = 51.5$

$s_{x_C} = 17.1$ $s_{x_T} = 11.0$

$N_C \geq 10 n_C$
all 3rd graders
$N_T \geq 10 n_T$
all 3rd graders who could use treatment

Reject H_0, There is evidence that the new activities improve DRP scores. There is a 1.3% chance or less of getting a difference in sample means this extreme if H_0 is true.

SRS

$N \geq 10n$

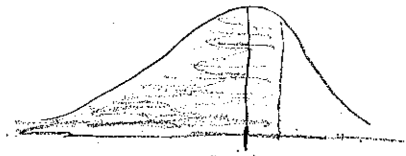
$\boxed{N \geq 10n}$

$np_0 \geq 10$ $\quad n(1-p_0) \geq 10$

$(555)(.488)$ $\quad (555)(.52)$

one-prop z test. 3. $\hat{p}_c = \frac{273}{555} = .492$ $\quad p_0 = .488$

$H_0: p = .488 \quad H_a: p > .488$



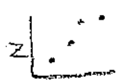
$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = \frac{.492 - .488}{\sqrt{\frac{.488(.512)}{555}}} = .189 \rightarrow .5753$$

$1 - .5753$

because p value > α level $\boxed{pvalue = .4247}$

Fail to reject H_0. There is no evidence that chemists are more likely than other parents to have female children.
We would get a $\hat{p}$ of 49.2% (as extreme as we did) 42% of the time if H_0 is true.

• SRS



4. 99% CI

$\underbrace{\bar{x}}_{\bar{x}} \pm \underbrace{t^* s/\sqrt{n}}_{t} = 22.125 \pm (5.841)(2.09/\sqrt{4})$ $\quad \pm 6.104 = m$

fairly normaly estimate — margin of error m

OK to do CI.

read p.525 bottom paragraph.

$\boxed{16.02 \text{ to } 28.23}$ book

$\boxed{16.021 \text{ to } 28.229}$ calc

} same

$m = t^* s/\sqrt{n}$

* 99% of the intervals produced will capture the true pop mean
or
* 99% confident that this interval will capture the true pop mean

re-sample z test. 5. $H_0: \mu = 12oz \quad H_a: \mu > 12oz$

$\sigma = .28oz \quad \bar{x} = 13oz$

• SRS
• $n = 30$ ∴ by CLT Sampling Distribution is normal
• $N \geq 10n$ - All donuts made at that bkry are > 300
• σ is known = .28

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{13 - 12}{.28/\sqrt{30}} = 19.56 \rightarrow pvalue \approx 0$$

Reject H_0. because Pvalue of 0 < α level of .05
There is strong evidence the new employees are making donuts too large. There is almost no chance of getting an $\bar{x}$ this extreme if H_0 is true.