① $n=8$ From calculator:

$\bar{x} = 10.87$ $s \approx 0.8066$

normal population
$n<30$
σ unknown
} use t

$1-\alpha = 0.9$

$\alpha = 0.1$

$df = n-1 = 7$

$t_{\alpha/2} = 1.895$

$$\bar{x} \pm t_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right)$$

$$10.87 \pm 1.895\left(\frac{0.8066}{\sqrt{8}}\right)$$

$$\boxed{10.33 \leq \mu \leq 11.41}$$

(2)

1) $H_o: \mu_1 - \mu_2 = 0$

$H_a: \mu_1 - \mu_2 > 0$

(right-tailed test)

2) The $n=5$ pairs are paired by location.

Assumptions:

$n < 30$

differences are normally distributed

3) $n = 5$ (# of pairs)

$\bar{d} = 1.66$ (mean of differences)

$s_d \approx 1.8823$ (sample SD of differences)

D_o is the hypothesized difference in H_o:

$D_o = 0$

$$t = \frac{\bar{d} - D_o}{(s_d/\sqrt{n})}$$

$$= \frac{1.66 - 0}{(1.8823/\sqrt{5})}$$

$$\approx 1.972$$

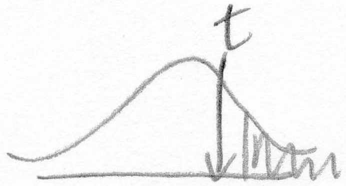
Continued →

② Cont'd

4) Right-tailed test

$\alpha = 0.05$

$df = n - 1 = 4$



$t_\alpha = 2.132$

5) Don't reject H_0

$\mu_1 - \mu_2 = 0$ or $\mu_1 = \mu_2$

6) p-value?

$t = 1.972$

	$t_{0.1}$		$t_{0.05}$
df=4	1.533	✓	2.132

$0.05 < p < 0.1$

(Don't double these because the test is one-tailed.)

(3)

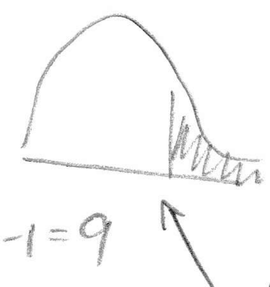
Assumptions:

normal population ✓

$n = 10$ $s^2 = 1.43$

$\sigma^2 = \dfrac{(n-1)s^2}{\chi^2}$

For a smaller σ^2 value use the larger χ^2 value.



$df = n-1 = 9$

$1-\alpha = 0.99$

$\alpha = 0.01$

$\chi^2_{0.01} = 21.666$

Plug into $\sigma^2 = \dfrac{(n-1)s^2}{\chi^2}$

$= \dfrac{9(1.43)}{21.666}$

≈ 0.59

$0.59 \leq \sigma^2$

④

1) H_0: $p_1 = 0.31$ $p_2 = 0.22$ $p_3 = 0.18$ $p_4 = 0.29$

H_a: At least one proportion is different.

2)

O	358	191	165	286
E	310	220	180	290

(n=1000)

$E_i = np_i$
$= 1000 p_i$

Assumptions:

Each $E_i \geq 5$ ✓

3) $$\chi^2 = \sum \frac{(O-E)^2}{E}$$

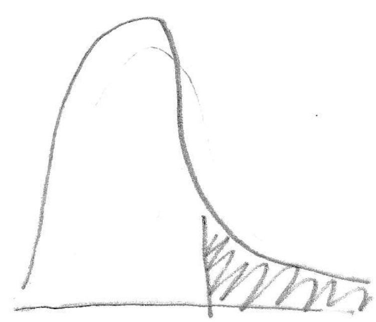
$$= \frac{(358-310)^2}{310} + \frac{(191-220)^2}{220} + \ldots$$

$$\simeq 12.560$$

4) $\alpha = 0.05$

df = # categories − 1 = 3

Goodness-of-Fit is always right-tailed!



$\chi^2_{0.05}$
$= 7.815$

Continued →

④ Cont'd

5) Reject H_0
At least one proportion is different.

6) p-value? $\chi^2 = 12.560$

df = 3

$\chi^2_{0.01}$	$\chi^2_{0.005}$
11.345	12.838

$0.005 < p < 0.01$

(Don't double these values because test is one-tailed.)