Math 373   Hw 24 Recommended problems, don’t turn this in.

Hw 390: 10.29*, 10.32.  Hw 400: 10.44, 10.46
Rec 390: 10.29, 10.35.  Hw 400: 10.45, 10.49.

Page 390. Interval checksums are to 2 decimal places.
10.29(4). A paired difference test with 10 difference pairs has mean difference $d = .3$ and std. dev. $s_d = .4$. You are to test $H_0: \mu_1 = \mu_2$ against $H_1: \mu_1 \neq \mu_2$ at $\alpha = .05$.
(a) Find the acceptance region for $\bar{d}$.

\[ \alpha = \frac{1}{2} - \frac{1}{2} = .05 \]

(b) Accept or reject the null hypothesis? Why?

(c) Find the minimum number of observations needed to estimate $\mu_1 - \mu_2$ to within $.1$ with probability .95. 8

(d) Suppose the significance level is $\alpha = .05$. Find the 90% confidence interval for the population variance $\sigma^2$.

(a) $df = \alpha = \chi^2_{.05} = \chi^2_{.95} = \chi^2_{.05}$

(b) Find the 90% confidence interval for $\sigma^2$ around the sample variance $s^2 = .3214$.

10.35(10). An enzyme CPK is measured from blood samples of 10 runners and 10 cyclists before and after exercise. The table gives the levels in units per liter.

Suppose the significance level is $\alpha = .05$

<table>
<thead>
<tr>
<th>runners</th>
<th>cyclists</th>
<th>difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>before</td>
<td>255.63</td>
<td>115.48</td>
</tr>
<tr>
<td>after</td>
<td>284.75</td>
<td>132.64</td>
</tr>
<tr>
<td>difference</td>
<td>29.12</td>
<td>21.01</td>
</tr>
</tbody>
</table>

Note that in (a) you shouldn’t use pooled std. devs (the $s^2_1/s^2_2$ ratio exceeds 3). You do have to use that formula for $df$. (a) does concern a difference in population means as in Lecture 22 but doesn’t use paired differences.

(a) Test for a significant difference between CPK levels in runners and cyclists before exercise.

SE = $\sqrt{\frac{s^2_1 + s^2_2}{2}} = \sqrt{\frac{115.48^2 + 132.64^2}{2}} = 17.83$

95% confidence interval around the observed difference: $\mu_1 - \mu_2 = [\ldots, \ldots]$

Is there a significant difference? Why?

(b) Find the 90% confidence interval for $\sigma^2$.

(c) Find the 90% confidence interval for $\sigma^2$.

(d) Should we accept the null hypothesis?

10.45. A random sample of $n = 15$ observations from a normal population produced a sample mean of $\bar{x} = 3.91$ and variance $s^2 = .3214$. Find the 90% confidence interval for the population variance $\sigma^2$.

(a) $df = \alpha = \chi^2_{.05} = \chi^2_{.95} = \chi^2_{.05}$

(b) Find the 90% confidence interval for $\sigma^2$ around the sample variance $s^2 = .3214$.

Note that in (a) you shouldn’t use pooled std. devs (the $s^2_1/s^2_2$ ratio exceeds 3). You do have to use that formula for $df$. (a) does concern a difference in population means as in Lecture 22 but doesn’t use paired differences.

(a) Test for a significant difference between CPK levels in runners and cyclists before and after exercise.

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(c) Find the 90% confidence interval for $\sigma^2$.

(d) Should we accept the null hypothesis?

Page 400. See worked examples for page 390 answers.

10.45.

(a) $df = 14  \alpha = 10\%  \chi^2_{.95} = 6.57063  \chi^2_{.05} = 23.6848$

(b) Find the 90% confidence interval for $\sigma^2$.

(c) $s^2 = 3.6667 \chi^2 = 2.75$

(d) Acceptance region for $\sigma^2$.

(e) Should we accept the null hypothesis?