

## Lab: Practice Exercises in Preparation for Exam 2

**9.20 Lab reagent, hypothesis test.** Let  $\mu$  represent the solution's true concentration.  $n = 6$ ,  $\sigma$  assumed to be 0.2. We calculate  $\bar{x} = 4.9883$ .

- $H_0: \mu = 5$  vs.  $H_a: \mu \neq 5$
- $z_{\text{stat}} = \frac{4.9883 - 5}{0.2/\sqrt{6}} = -0.14$ .
- One-sided  $P$ -value =  $\Pr(Z < -0.14) = .4443$ . Two-sided  $P$ -value =  $2 \times .4443 = .8886$ .
- The evidence against the null hypothesis is weak; the average concentration is not significantly different from 5.

**10.17 Lab reagent, 90% CI for true concentration.**  $\bar{x} = 4.9883$ ;  $n = 6$ , and  $\sigma$  is assumed to be 0.2. For 90% confidence, use  $z_{1-.05/2} = z_{.95} = 1.645$ .  $SE_{\bar{x}} = \frac{0.2}{\sqrt{6}} = 0.08165$

90% CI for  $\mu = 4.9883 \pm (1.645)(0.08165) = 4.9883 \pm 0.1343 = (4.854 \text{ to } 5.123)$ . The true average is likely to be in this range, with 95% confidence.

**9.21 Lab reagent, power.**

$$1 - \beta = \Phi\left(-z_{1-\frac{\alpha}{2}} + \frac{|\mu_0 - \mu_a| \sqrt{n}}{\sigma}\right) = \Phi\left(-1.96 + \frac{|5 - 4.75| \sqrt{6}}{0.2}\right) = \Phi(1.10) = 0.8643$$

**11.30 Therapeutic Touch,  $n = 28$ .**

(a) This stemplot shows no clear departures from Normality

```
0 * | 1
t | 233333333
f | 444445555555
s | 66777
. | 8
x 1
```

(b)  $t$  procedures can be used because there are no clear departures from Normality and the sample is moderate in size.

(c) For 95% confidence,  $\alpha = .05$  and  $t_{28-1, 1-.05/2} = t_{27, .975} = 2.052$ .  $SE_{\bar{x}} = \frac{1.663}{\sqrt{28}} = 0.3143$ . The 95%

CI for  $\mu = 4.393 \pm (2.052)(0.3143) = 4.393 \pm 0.6449 = 3.75 \text{ to } 5.04$ . Since “5” is included as a possible value for  $\mu$  in this 95% confidence interval, data are consistent with “5 out of 10” random guessing.

**12.23 Linoleic acid and HDL cholesterol.**

(a) Group 1 clearly has higher values on average.

(b) Hypothesis test

- $H_0: \mu_1 - \mu_2 = 0$  vs.  $H_a: \mu_1 - \mu_2 \neq 0$
- $t_{\text{stat}} = \frac{6.192 - 5.414}{0.2702} = 2.87$  with  $df_{\text{conserv}} = n_2 - 1 = 7 - 1 = 6$
- One-sided  $P$ -value from Table C is bracketed by .025 and .01. Thus, the two-sided  $P$  is between .05 and .02, constituting good evidence against  $H_0$  (“significant difference”).