Math 2311
Written Homework 12 (Sections 8.3 – 8.5) - KEY

Name:_________________________ PeopleSoft ID:________________

Instructions:
- Homework will NOT be accepted through email or in person. Homework must be submitted through CourseWare BEFORE the deadline.
- Print out this file and complete the problems.
- Use blue or black ink or a dark pencil.
- Write your solutions in the space provided. You must show all work for full credit.
- Submit this assignment at http://www.casa.uh.edu under "Assignments" and choose whw12.

1. Section 8.3, Problem 2

Let group 1 be Nitrate and group 2 be Control:

\[ H_0 : \mu_1 = \mu_2 \]
\[ H_a : \mu_1 < \mu_2 \]

\[ t = \frac{7880 - 8112}{\sqrt{\frac{1115^2}{30} + \frac{1250^2}{30}}} = -3.048 \]

\[ p-value = p(t < -3.048) = 0.0024 < \alpha \]

Based on 2% significance level, we will reject the null hypothesis which states that there is no difference in the mean amino acid uptake between nitrates and control group in favor of saying the nitrates decrease amino acid uptake.

2. Section 8.3, Problem 4

Let group 1 be Method 1 and group 2 be Method 2:

\[ H_0 : \mu_1 = \mu_2 \]
\[ H_a : \mu_1 > \mu_2 \]

\[ t = \frac{85 - 83}{\sqrt{\frac{3^2}{75} + \frac{2^2}{60}}} = 4.629 \]

\[ p-value = p(t > 4.629) = 1.03 \times 10^{-5} < \alpha \]

Based on 1% significance level, we will reject the null hypothesis which states that there is no difference in method 1 and method 2 in favor of saying method 1 is more successful.
3. Section 8.3, Problem 6

```r
> stick=c(25.8,26.9,26.2,25.3,26.7,26.1)
> liquid=c(16.9,17.4,16.8,16.2,17.3,16.8)
> mean(stick)
[1] 26.16667
> sd(stick)
[1] 0.5853774
> mean(liquid)
[1] 16.9
> sd(liquid)
[1] 0.4289522
> (26.16667-16.9)/sqrt((.5854)^2/6+(.429)^2/6)
[1] 31.27545
> 2*(1-pt(31.27545,5))
[1] 6.273945e-07
```

Let group 1 be stick and group 2 be liquid:

\[ H_0 : \mu_1 = \mu_2 \]
\[ H_a : \mu_1 \neq \mu_2 \]
\[ t = 31.27545 \]

\[ p-value = 2 \cdot p(t > 31.27545) = 6.27 \times 10^{-7} < \alpha \]

Based on 1% significance level, we will reject the null hypothesis which states that there is no difference in stick and liquid in favor of saying there is a difference.

4. Section 8.4, Problem 2

\[ H_0 : p_1 = p_2 \]
\[ H_a : p_1 \neq p_2 \]

\[ z = \frac{653}{1046} - \frac{791}{1327} = 1.397 \]

\[ p-value = 2 \cdot p(z > 1.397) = .1623 > \alpha \]

Based on 1% significance level, we will fail to reject the null hypothesis.
5. Section 8.4, Problem 3
(see odd answers)

6. Section 8.4, Problem 4

\[ H_0 : p_1 = p_2 \]
\[ H_a : p_1 \neq p_2 \]

\[
z = \frac{\frac{36}{60} - \frac{31}{50}}{\sqrt{\frac{\frac{36}{60}(1 - \frac{36}{60})}{60} + \frac{\frac{31}{50}(1 - \frac{31}{50})}{50}}} = -0.214
\]

\[ p\text{-value} = 2 \cdot p(z < -0.214) = 0.8305 > \alpha \]

Based on 5% significance level, we will fail to reject the null hypothesis.
7. Section 8.5, Problem 2

\[ \chi^2 = 0.355 \]

\[ p-value = 0.986 > \alpha \]

Fail to reject H₀

8. Section 8.5, Problem 3

(see odd answers)