**FW3200 – Quiz No. 2** **February 22, 2008**

You have 30 minutes. Take your time!
Note that this sheet has **two sides**. **Name:** A. Student

In class we considered an example where two stands were sampled and species evenness measured at each of several sample points. We applied an unpaired test for differences using the Excel Analysis ToolPak wizard. Here's the output:

| t-Test: Two-Sample Assuming Equal Variances | | |
|---|---|---|
| | | |
| | *StandA* | *StandB* |
| Mean | 0.817746917 | 0.802806911 |
| Variance | 0.014591631 | 0.007385621 |
| Observations | 15 | 21 |
| Pooled Variance | 0.010352802 | |
| Hypothesized Mean Difference | 0 | |
| df | 34 | |
| t Stat | 0.434336006 | |
| P(T<=t) one-tail | 0.333394261 | |
| t Critical one-tail | 1.690923455 | |
| P(T<=t) two-tail | 0.666788521 | |
| t Critical two-tail | 2.032243174 | |

ONE: The table says the hypothesized mean difference is "0".

a) Give the **statistical** null hypothesis; **i.e., use symbols not words**:

Ho: $\mu_A - \mu_B = 0$ (or $\mu_A = \mu_B$)

b) One possible research hypothesis is that evenness in Stand A is different than in Stand B. Give the corresponding **statistical** alternative hypothesis. Then, using the results above draw a conclusion for this statistical test, and explain your rationale.

Ha: $\mu_A - \mu_B \neq 0$

Fail to reject because t-calc = 0.4343 is in-between $t_{crit} = 2.03$ and $-t_{crit} = -2.03$

c) Another possible research hypothesis is that evenness in Stand A is **greater** than in Stand B. Give the corresponding **statistical** alternative hypothesis. Then, using the results above draw a conclusion for this statistical test, and explain your rationale.

Ha: $\mu_A - \mu_B > 0$

Fail to reject because t-calc = 0.434 is less than t-crit = 1.69

TWO: You've radio-collared 12 wolves selected randomly on Isle Royale, and tracked the number of kilometres they traveled this winter. Give the general **mathematical** form of a confidence interval for the mean number of kilometres traveled by a wolf in this population.

$$\bar{x} \pm t_{(\alpha/2,\, n-1)} \cdot s_{\bar{x}}$$

THREE: Following is a setup for a goodness-of-fit test. The data are counts of students, by season they were born in, who took FW4130 a while back. The research hypothesis is that students are **twice as likely** to have been born in spring or summer as fall or winter. This defines the expected ratio.

Fill in all of the blanks in the table.

| Species | Observed frequency | Expected ratio | Expected proportion | Expected frequency |
|---|---|---|---|---|
| *Spring* | 11 | 2 | 2/6 | (2/6)×36 |
| *Summer* | 14 | 2 | 2/6 | (2/6)×36 |
| *Fall* | 3 | 1 | 1/6 | (1/6)×36 |
| *Winter* | 8 | 1 | 1/6 | (1/6)×36 |
| **TOTAL** | **36** | 6 | **1** | **36** |

FOUR: The example Dytham (2003) uses to illustrate the Chi-square goodness-of-fit test involves the Poisson distribution. **Why?**

The Poisson can be used as a reference distribution for randomness.

Write nothing below the line above.