Name:

Math 10a Quiz 12
December 4, 2013

1. (3 points) Define type I and type II errors for hypothesis tests.

   A type I error occurs when the null hypothesis is true but the data indicates that you should reject the null. A type II error when the null hypothesis is false but the data does not give you enough evidence to reject the null.

2. (1 point) Fill in the blank: if the p-value is greater than the significance level α then the data does not give enough evidence to reject the null hypothesis.

3. Researchers test to see if a certain kind of steroid changes the average weight of mice. To do so they inject a sample of 10 mice with the steroid and, after waiting for the weights to stabilize, they compare the average weight of mice with steroids to the known average weight w_0 of normal mice.

   (a) (3 points) Write down null and alternative hypotheses for this investigation.

   One possible answer is:

   $$w = \text{average weight of mice on the steroid}$$

   $$H_A : w \neq w_0$$

   $$H_0 : w = w_0.$$

   Or one could write this as an English sentence: the alternative hypothesis is that the steroid changes the average weight of mice and the null hypothesis is that the steroid does not affect the average weight of mice.

   (b) (1 point) In terms of this situation (mice, steroids, etc) explain what a type II error would be.

   A type II error would occur if the steroid does affect the weight of the mice, but the data does not indicate this.

   (c) (2 point) In analyzing this situation, would a z or t test be more appropriate and why?

   The sample size is small (10) so a t-test would be appropriate. In the lecture slides, it mentions that a good rule of thumb is that for samples with fewer than 100 individuals it is advised to use the t-test instead of the z-test.