

Math4310/Biol6317

Problem Set 8, due Thu, Nov 3, 2011

- Problem 1. Consider Problem 2 from Set 7. Test whether or not there was a decline (negative change) in FEV over the 2 year interval of the study. State the appropriate null and alternative hypotheses. Compute the relevant p-value and state assumptions that you make to obtain it.
- Problem 2. A possibly larger study evaluates the two-year decline in non-smokers of a different age. Compute which sample size is needed to obtain a power of 0.8 for detecting a change in FEV over two years at least as large as that observed in Problem 2 of Set 7. Use the data in that problem to extract any relevant constants you might need to compute the necessary sample size.
- Problem 3. Someone suggests to perform the following simulation in order to support the claim that the p-value can be used as a score: Randomly simulate 10,000 sample means of size 16 from a normal distribution with mean 5 and variance 1. Calculate 10,000 test statistics for a test of $H_0 : \mu = 5$ versus $H_a : \mu < 5$. Using these test statistics calculate the 10,000 p-values for these tests. Plot a histogram of the p-values. Comment on what you observe about the histogram, and explain how you would retain or reject the null hypothesis in your tests based on p-values, in order to achieve a given probability α of type I errors.
- Problem 4. **Only for students enrolled in Biol6317.** In teams of two students, begin working out the solution to Project 1, posted on the course webpage. This project is due Nov 10.