MONT 105Q – Mathematical Journeys
Hypothesis Testing Practice Problems
April 1, 2016

Directions:

   For each question, first identify and state relevant null and alternative hypotheses. Then carry out the indicated hypothesis test, state your conclusions briefly and cogently, and answer any other questions.

1) The average CO_2 emissions for a collection (sample) of 100 large power plants is $\overline{Y} = 2223.1$ lb/Mwh, with sample $SD = 211.3$ lb/Mwh.

   a) If this were a random sample, and we carried out a hypothesis test designed to make the probability of a Type I error equal $\alpha = .05$, would there be sufficient evidence to say that the average coal-fired power plant emits an amount greater than 2200 lb/Mwh?
   b) But now, suppose you knew that this data was collected from just the 100 largest power plants in the country. Is this a random sample? Does the calculation in part a) really make sense in this setting?

2) In a sample of $n = 50$ field mice caught in the wild, the average body length (excluding the tails) was $\overline{Y} = 6.8$ cm with a sample SD $= .4$ cm. With a hypothesis test designed to make the probability of a Type I error equal $\alpha = .05$, would there be sufficient evidence to say that population body length is different from 7 cm?

3) A medical study compared the resting pulse rates of random, independent samples of 100 smokers and 100 nonsmokers. The smokers had an average pulse rate of $\overline{Y} = 86$ beats per minute with $SD_1 = 5.4$, while the nonsmokers had an average pulse rate of $\overline{X} = 80$ and $SD_2 = 4.9$. With a hypothesis test designed to make the probability of a Type I error equal $\alpha = .01$, would there be sufficient evidence to say that nonsmokers have a lower average pulse rate?