# IEOR 151 – Homework 2
## Due Wednesday, September 18, 2013 in class

1. A restaurant chain believes that it can increase revenues by adding healthier food options to its menu. As an experiment, the chain randomly selects twenty restaurants in which to add healthier options. The remaining fifty restaurants in the chain keep the existing menu.

   (a) What is the null hypothesis? (1 point)

   (b) Suppose the management has decided that if the revenue of the healthier restaurants is higher, then the new menu will be used at all restaurants. What is the alternate hypothesis? Should a one-sided or two-sided hypothesis test be used? (2 points)

   (c) Suppose the management has decided that if there is no difference in revenue between the two groups, then the healthier menu will be used at all restaurants. What is the alternate hypothesis? Should a one-sided or two-sided hypothesis test be used? (2 points)

   (d) An operations engineer is deciding between using a two-sample $t$-test or a Mann–Whitney $U$ test for this analysis. Which test would you recommend using for this application, and why would you give this recommendation? (2 points)

2. For each the following scenarios, would you (i) accept the null hypothesis, (ii) reject the null hypothesis, or (iii) gather additional data and information before making a decision? Explain your reasoning. Note: The numbers in the scenarios below are fictional.

   (a) The null hypothesis is that doctors who use paper records while working in the hospital make as many medical errors on average as doctors who use electronic records, the difference in average errors per month is 10 more errors per month for doctors using paper records, and $p = 0.051$. (2 points)

   (b) The null hypothesis is that restaurant chefs who use Twitter cook slower than chefs who do not tweet, the difference between the average time to cook a dish is 5 seconds, and $p = 0.049$. (2 points)

   (c) The null hypothesis is that drugs $A$ and $B$ lead to equal reductions in proteinuria for patients with chronic kidney disease, the difference in average reduction is 1 g/day from an average baseline of 3 g/day, and $p = 0.023$. (2 points)

   (d) The null hypothesis is that the speed of light in a vacuum is the same if the light is traveling north versus traveling south, and $p = 0.009$. (2 points)

3. Which hypothesis test would you select for each of the following scenarios below?

   (a) Comparing average service time given data of call center service time for 100 employees at location $A$ and 130 employees at location $B$. (1 point)

   (b) Comparing average customer satisfaction given continuous (not categorical) measurements of customer satisfaction for 10 customers at restaurant $A$ and 25 customers at restaurant $B$. (1 point)

   (c) Comparing average cost per day given cost of medical supplies used per day for 50 hospitals in Region $A$ and 75 hospitals in Region $B$. (1 point)