You may do this homework in groups of one or of two. The answers are due by email, to daf@cs.uiuc.edu, with CS 498 in the title, by **October 31**.

1) The body mass index (BMI) is a number computed to give some idea of how much body fat an individual carries. It is computed as 703*(weight in pounds)/(height in inches)^2. The use of the index is moderately controversial; you can look at the wikipedia page for some discussion. One item of belief is that the normal range for BMI is 18.5-25 (under 18.5 is underweight; over 25 is overweight; over 30 is obese). Use the height-weight dataset (from http://www2.stetson.edu/~jrasp/data.htm , go to that webpage, then look for bodyfat.xls) to test the hypothesis that the mean human bmi is 21.25

2) Five people play the "odd man out" game. In this game, each person flips a coin of their own. If four coins come up one face, and the fifth comes up another, then the person with the odd coin loses; otherwise, they go again, until a loser is found. Over a period of time, they play this game many times. The number of losses is given in the table. Use the Chi-squared test to determine whether the number of losses is consistent with game being played fairly.

Person	Number of losses
1	10
2	9
3	11
4	13
5	7

3) Testing hypothesis tests by simulation: Perform the following experiment. Draw two samples at random, without replacement, of 30 heights from the height-weight dataset, and use a z-test to test whether they come from the same population or a different population. Use a two-sided test, and a significance level of 5%. Now repeat the experiment 1000 times (using Matlab!). For what fraction of these experiments was the hypothesis rejected? What conclusion can you draw?