

Investigation 2: Ice Cream Calories (assigned Wed Jan 18; due Wed Jan 25)

You may work with a group of as many as three students on this assignment, handing in one report with all names, provided that you all contribute to the work. Word-processed reports are preferred to hand-written ones. Please copy/paste relevant, well-labeled computer output into a Word file as appropriate.

Food products are required by law to provide nutritional information on their labels, and many companies post such data on their websites. The Minitab worksheet `IceCreamCalories.mtw` (available under the “data files” link on our course webpage) contains data on calorie amounts per serving for flavors of Ben & Jerry’s (c1 and c2), Cold Stone Creamery (c4 and c5), and Dreyer’s (c7 and c8), as collected from their websites in August 2006. [Note: If you are working on a computer that has Minitab software, click on the filename to open it. Minitab is available on the PC computers in the library. To download Minitab for your own PC, see the instructions on our course webpage.]

Start by analyzing the data for Ben & Jerry’s (B&J) ice cream only; ignore the Cold Stone and Dreyer’s data for now.

a) Use Minitab to produce a histogram of these B&J calorie amounts (`Graph> Histogram`). Write a paragraph commenting on what this graph reveals. [Note: Use copy/paste to get the graph into a Word document. If the graph does not copy well, try using “paste special” and paste the object as a “picture.” You may want to “crop” the graph to eliminate extra space, and you may want to resize it to not waste paper when you print.]

b) Identify the B&J flavor(s) with the fewest calories, and the B&J flavor(s) with the most calories.

c) Use Minitab to calculate the five-number summary of these B&J calorie amounts (`Stat> Basic Statistics> Display descriptive statistics`; click on “Statistics” and select the appropriate ones). Also use Minitab to produce a boxplot (`Graph> Boxplot`). [Report the five-number summary and hand in the boxplot.] Identify any flavors that are identified as outliers.

d) Pick one of these B&J flavors that sounds especially good to you. Comment on where this flavor’s calorie amount falls in the distribution. Do the same for my favorite flavor: Marsha Marsha Marshmallow.

Now compare the calorie amounts across all three brands.

e) Calculate the five-number summary of calorie amounts per serving for each brand. Also produce boxplots of calorie amounts for comparing the three brands on the same scale/axis (`Graph> Boxplot; Multiple Y’s, Simple`). Comment on how the three brands’ calorie amounts per serving compare.

One problem with this analysis is that whereas Ben & Jerry's and Dreyer's both consider a serving to be $\frac{1}{2}$ cup, Cold Stone Creamery considers a serving to be 170 grams. To produce a meaningful comparison, we need to convert these calorie amounts to be on a common serving size. One difficulty is that $\frac{1}{2}$ cup is a measure of volume and 170 grams is a measure of weight. The conversion is therefore not as simple as, say, converting inches to centimeters (both measures of length). The website gourmetsleuth.com has a "gram conversion calculator" that applies to individual food items. It suggests that the conversion rate for ice cream is roughly 146 grams per cup.

f) Use Minitab to do this conversion. [*Hint*: First divide the Cold Stone calorie amounts by 170 to put them on a "per gram" basis, and then multiply by 146 to put them on a "per cup" basis, and then divide by 2 to put them on a "per half cup" basis. Do this with Minitab's let command: At the MTB> prompt, type: `let c6 = c5/170*146/2`. If you do not see the MTB> prompt, click in the session (top) window and then select `Editor> Enable commands`.] Then use Minitab to re-calculate the five-number summary for the Cold Stone calorie amounts on this "per half cup" scale. Report the new five-number summary, and comment on how it has changed.

g) Use Minitab to re-produce the boxplots for comparing the three distributions of calorie amounts, now that all three brands are on a common serving size. Summarize what these three boxplots reveal about how the three brands compare.