

# Basic Data Analysis

## Makeup Final Examination

October 7, 2009

### Problems

When you are asked to do a calculation, you do not need to compute the decimal equivalent of a fraction or radical (square root). Fractions should be reduced to lowest terms for convenience in grading. Radicals do not need to be reduced.

For Problems 1 to 5, use **Data Set A**. (Each student receives a different data set.) Data Set A is a data set of the number of cars passing through an intersection in one hour. Note that the data set has the *true* standard deviation reported; you do not need to calculate it.

80 Your data sets have data set ID #80. Be sure to enter your data set ID in the space provided.

Data Set A: 236 192 283 276 205 226 257 237 245 240

The *true* standard deviation of your data is 29.

1. According to the planning office, this intersection is designed for a capacity of 200 cars/hour. If more cars than that try to pass, congestion results and travellers will be delayed. With this fact in mind, divide your data into **four** (4) cells. **Explain** why you chose those cells, and draw the histogram.





8. Explain the difference between the *population mean* and the *expected value of the estimate of the mean*. Give an equation relating the two values. What condition do you need to assume for the equation to be true?
9. Formulate the hypothesis that the intersection is operating at design capacity, *i.e.*, the average traffic flow is 200 cars/hour, at the significance level 5%. Include the following information: What is the *null hypothesis* you test? Is your test *one-sided* or *two-sided*? What is the *alternative hypothesis*?
10. (continued) Test the hypothesis of the previous problem. Include the following information in your answer: What is the *standard error* of the sample mean  $\bar{X}$ ? What is the *critical value* such that if  $\bar{X}$  exceeds that value, you reject the null hypothesis? Do you *accept* or *reject* the null hypothesis? You may estimate  $\sqrt{10} = 3$  and  $\Phi(1.65) = 0.95$  in your calculations, where  $\Phi$  is the CDF of a standard normal random variable. *Show your work!*

Based on your hypothesis test, what policy would you recommend to the city planner?

Name \_\_\_\_\_ Dataset# \_\_\_\_\_ ID# \_\_\_\_\_ 5