

Midterm questions (53 points)
Time allotted: 90 minutes
Clock yourself!

Please write your name and answers on the answer sheet provided—not on this question sheet.

1. (4½ points) During the week of March 7, 1997, Philadelphia police pulled over 262 drivers. Although Philadelphia is mostly white, whites made up only 14.1% of the drivers who were pulled over. 79.0% of the drivers pulled over were black, 2.7% were Latino, and 4.2% were Asian. (*Source.* Data from Philadelphia Police Department, compiled by Jeannine Sims.)
 - a. (2½ points) Suppose you work for a civil rights advocacy group. Draw a pie chart that *emphasizes* how many of the drivers pulled over were black. Explain what you have done to emphasize black drivers.
 - b. (2 points) Under pressure, the police changed their behavior. By the week of October 6, 1997, black drivers were involved in just 44.5% of traffic stops. Suppose you work for the police department. Draw a time series that *emphasizes* the decline in black pullovers from March to October. Explain what you have done to emphasize this decline.

2. (26½ points) In assessing the impact of possible discrimination by traffic cops, it is important to know how often black drivers are pulled over. The table below describes a random sample of 9,415 black Americans who are old enough to drive, giving the number of times that each of them was pulled over (stopped) by police in 1999. (*Source.* Contacts Between Police and the Public: Findings from the 1999 National Survey.)
 - a. (2 points) Complete the table by filling in the percentages and cumulative percentages.

Number of stops	Number of drivers
0	8257
1	867
2	173
3	51
4	28
5 or more	39

- b. (4 points) Interpret in a couple of sentences all of the numbers in the gray row, including the percentage and cumulative percentage.
- c. (2½ points) Draw a histogram of the data and describe its shape in technical language.
- d. (2 point) What is the mode? Interpret the mode in a sentence.
- e. (2 points) What is the median? Interpret the median in a sentence.

- f. (4 points) Let's pretend that all the drivers with "5 or more" stops had *exactly* 5 stops. If this were true, what would be the mean? What would be the standard deviation?
 - g. (4 points) In truth, some of the drivers had *more* than 5 stops—one was stopped 40 times! Knowing this, would you say that the true sample mean is larger or smaller than what you have just calculated? What about the standard deviation? Explain.
 - h. (2 points) Is the mean larger or smaller than the median? Why?
 - i. (2 points) Would the trimmed mean be larger or smaller than the mean? Why? (Don't do any calculations.)
 - j. (2 points) What is the Z score for someone with 1 stop? Interpret this Z score in a sentence.
3. (16 points) There are perhaps 25 million black Americans of driving age. Describe these people using information from the previous question. As before, pretend that all respondents with "5 or more" stops had *exactly* 5 stops.
- a. (1 point) What percentage of black driving-age Americans was stopped *at least* once? Give a point estimate, and interpret it in an ordinary sentence.
 - b. (4 points) Give a 95% confidence interval for the quantity that you have just estimated. Interpret this confidence interval in a sentence.
 - c. (2 points) Would an 85% confidence interval be wider or narrower than the interval you have just calculated? Why? (Don't do any calculations.)
 - d. (2 points) Give a point estimate for the average number of times a black driving-age American was stopped by police in 1999. Interpret this point estimate in an ordinary sentence (that doesn't use the phrase "point estimate").
 - e. (5 points) Give a 99% confidence interval for the quantity that you have just estimated. Interpret this confidence interval in an ordinary sentence (that doesn't use the phrase "confidence interval").
 - f. (2 points) Your confidence interval is very narrow. Does this mean you should collect more data, or that you could have gotten away with collecting less? Explain.
4. (6 points) In 1998, doctors in New Jersey extracted eggs from over a hundred 40-year-old infertility patients. 48% of the extracted eggs were chromosomally abnormal.
- a. (2 points) From what population were these women sampled?
 - b. (2 points) In April 2002, *Time* magazine ran a cover story on the "hard facts" about fertility and age. Citing the New Jersey study, *Time* wrote: "At 40, half a woman's eggs are chromosomally abnormal." Is this a reasonable interpretation of the study results? Why or why not?
 - c. (2 points) Do you think that abnormal eggs are more common, less common, or about as common as the quote from *Time* implies? Why?