

1. (15 pts) As a demonstration, a statistics teacher took a penny, bent it slightly, and then tossed it 1000 times (while his students watched attentively). He obtained 542 heads and 458 tails. Can he conclude from these data that the coin is biased, i.e., does not land heads 50% of the time? Test the hypothesis at the 1% level of significance. Show all seven steps.
2. (15 pts) On the CNN website, they report the results of a survey asking the question "Will gun control be a factor when you vote for president next year?" The poll was no doubt inspired by the Virginia Tech shootings. Of the 216,000 people responding, 42% said yes and 58% said no. Use a 95% confidence interval to estimate the true proportion of people for whom it will *not* be an issue.
3. (15 pts) A random sample of 10 hamburgers produced by a fast-food restaurant showed the following fat content, in grams:

28 29 34 24 22 29 35 28 28 33

- Assume that the fat content of all hamburgers from this restaurant has a normal distribution. Test the hypothesis at the 1% level of significance that the average fat content of this restaurant's hamburgers is less than 32 grams. Show all seven steps.
4. (20 pts) Using the data of the previous problem,
    - (a) (10 pts) Find a 90% confidence interval to estimate the mean fat content of all hamburgers produced by this restaurant.
    - (b) (5 pts) Give the margin of error of your estimate in part (a).
    - (c) (5 pts) Would a 95% confidence interval, based on the same data, have a larger margin of error or a smaller margin of error than the 90% confidence interval found in part (a)?
  5. (20 pts) In 2005 in the Middle Atlantic states, the average hourly wage in metropolitan areas was \$21.44, with a standard deviation of \$3.22, and the average hourly wage in non-metropolitan areas was \$16.74, with a standard deviation of \$8.37. Assume that these statistics were obtained from two samples, each of size 100.
    - (a) (15 pts) Test, at the 5% level, the hypothesis that the average hourly wage in metropolitan areas is higher than it is in non-metropolitan areas. Show all seven steps
    - (b) (5 pts) What is the pooled estimate for  $\sigma$  in this problem?

Turn over and continue.

6. (15 pts) The group Action on Smoking and Health reports that in 2003, 28% of the men in Great Britain smoked. They also report that in 2003, 24% of the women in Great Britain smoked. Suppose that this information is based on a survey of 1000 men and 600 women. Test the hypothesis at the 5% significance level that more men than women smoked in Great Britain in 2003. Show all seven steps.