

Math 1040, Spring 2007
Instructor: Alla Borisyuk
Review and practice problems for Midterm 3
(April 18, 2007; 8:35 to 9:25 am)

Please, keep in mind that the test may include any of the material that we encountered in class/homeworks, even if it does not directly appear in the practice problems.

During the test you will be provided with a copy of Table B, Table 21.1, Table 24.1, formulae for confidence intervals, formulae for hypothesis testing, including formula for chi-square statistic

Primary topics covered

- Chapter 21: **Confidence intervals.** Computing and interpreting confidence intervals for the population proportion and population mean. Relationship between confidence level and size of the confidence interval. Margin of error.
- Chapter 22: **Hypothesis testing.** Performing hypothesis testing following 4-step procedure. Formulating hypothesis and alternative (either about proportion or about mean of the population). Calculating the appropriate statistic. Calculating P-value. Making conclusion and answering the question of the problem. Level of significance.
- Chapter 24: **Two-way tables; hypothesis testing for two-way tables.** Describing relationship between variables by computing percentages. 4-step hypothesis testing about the relationship in a two-way table (chi-square statistic)

Practice problems

1. An SRS of 489 adults found that 347 chose World War II from a list of events as the most important event of the 20th century.
 - a) Give 90% confidence interval for the proportion of all adults who think World War II was the century's most important event.
 - b) Explain in plain words what the result from a) means
 - c) Give 99% confidence interval for the proportion of all adults who think World War II was the century's most important event.
 - d) Explain briefly what important fact about confidence intervals is illustrated by comparing the intervals from a) and c)
2. A study of 104 corporations found that the pay of their chief executive officers had increased an average of 6.9% per year. The standard deviation of the percentage increases was 17.4%.
 - a) Give a 95% confidence interval for the mean percentage increase in pay for all corporate CEOs.
 - b) Explain your result in plain words.
3. An SRS of 1039 adults found that 374 said that drinking had been a problem in their families. Is this good evidence that drinking has been a problem in the families of more than 1/3 of American adults?
4. An environmentalist group collects a liter of water from each of 45 random locations along a stream and measures the amount of dissolved oxygen in each specimen. They suspect that the mean level of oxygen is different from the regulation-prescribed average of 5 milligrams (mg). In fact, they find that the mean is 4.62 milligrams (mg) and the standard deviation is 0.92 mg. Is this result significant at 0.01 level of significance?
5. A study of complaints by HMO members compared those who filed a medical complaint with those who filed a non-medical complaint and those who did not complain. In each group they recorded the numbers of people who left HMO voluntarily, and those who stayed. Here is the data:

| | No complaint | Medical compl. | Non-medical | Total |
|--------|--------------|----------------|-------------|-------|
| Stayed | 721 | 173 | 412 | 1306 |
| Left | 22 | 26 | 28 | 76 |
| Total | 743 | 199 | 440 | 1382 |

- a) Find the percentage of each group who left.
- b) Is relationship between leaving the HMO and complaints significant? (Hint: Use chi-square test)