

# Review 2-Samples Proportions

Statistics

Name: \_\_\_\_\_

**Directions:** Work on these sheets. Answer completely, but be concise. A normal probability table is attached.

**Part 1: Multiple Choice.** Circle the letter corresponding to the best answer.

- In an opinion poll, 25% of a random sample of 200 people said that they were strongly opposed to having a state lottery. The standard error of the sample proportion is approximately
  - 0.03
  - 0.25
  - 0.0094
  - 6.12
  - 0.06
  - None of the above. The answer is \_\_\_\_\_.
- You want to design a study to estimate the proportion of students on your campus who agree with the statement, "The student government is an effective organization for expressing the needs of students to the administration." You will use a 95% confidence interval and you would like the margin of error to be 0.05 or less. The minimum sample size required is approximately
  - 22
  - 1795
  - 385
  - 271
  - None of the above. The answer is \_\_\_\_\_.
- An opinion poll asks a random sample of adults whether they favor banning ownership of handguns by private citizens. A commentator believes that more than half of all adults favor such a ban. The null and alternative hypotheses you would use to test this claim are:
  - $H_0 : \hat{p} = 0.5; H_a : \hat{p} > 0.5$
  - $H_0 : \hat{p} = 0.5; H_a : \hat{p} \neq 0.5$
  - $H_0 : p = 0.5; H_a : p \neq 0.5$
  - $H_0 : p = 0; H_a : p > 0$
  - None of the above. The answer is \_\_\_\_\_.
- A radio talk show host with a large audience is interested in the proportion  $p$  of adults in his listening area who think the drinking age should be lowered to eighteen. To find this out he poses the following question to his listeners. "Do you think that the drinking age should be reduced to eighteen in light of the fact that eighteen-year-olds are eligible for military service?" He asks listeners to phone in and vote "yes" if they agree that the drinking age should be lowered and "no" if not. Of the 100 people who phoned in 70 answered "yes." Which of the following conditions for inference about a proportion using a confidence interval are violated?
  - The data are an SRS from the population of interest.
  - The population is at least ten times as large as the sample.
  - $n$  is so large that both the count of successes  $np$  and the count of failures  $n(1 - p)$  are ten or more.
  - There appear to be no violations.
  - More than one condition is violated.

5. A polling organization announces that the proportion of American voters who favor congressional term limits is 64 %, with a 95% confidence margin of error of 3 %. This means that
- (a) If the poll were conducted again in the same way, there is a 95% chance that the fraction of voters favoring term limits in the second poll would be between 61 % and 67 %.
  - (b) There is a 95% probability that the true percentage of voters favoring term limits is between 61 and 67%.
  - (c) If the poll were conducted again the same way, there is a 95% probability that the percentage of voters favoring term limits in the second poll would be within 3 % of the percentage favoring term limits in the first poll.
  - (d) Among 95% of the voters, between 61 % and 67 % favor term limits.
  - (e) None of the above.
6. An SRS of size 100 is taken from a population having proportion 0.8 successes. An independent SRS of size 400 is taken from a population having proportion 0.5 successes. The sampling distribution of the difference in sample proportions has what mean?
- (a) 0.3
  - (b) 0.15
  - (c) The smaller of 0.8 and 0.5
  - (d) The mean cannot be determined without the sampling results.
  - (e) None of the above. The answer is \_\_\_\_\_
7. This is a continuation of Problem 6. The sampling distribution for the difference in sample proportions has what standard deviation?
- (a) 1.3
  - (b) 0.40
  - (c) 0.047
  - (d) 0.0002
  - (e) None of the above. The answer is \_\_\_\_\_.



Mars Inc., makers of M&M candies, claims that they produce plain M&Ms with the following distribution:

Brown: 30%	Red: 20%	Yellow: 20%
Orange: 10%	Green: 10%	Blue: 10%

A bag of plain M&Ms was selected randomly from the grocery store shelf, and the color counts were as follows:

Brown: 16	Red: 11	Yellow: 19
Orange: 5	Green: 7	Blue: 3

10. You want to conduct an appropriate test of the manufacturer's claim for the proportion of yellow M&Ms. Identify the population parameter of interest. Then state hypotheses.
11. State and verify the conditions for performing the significance test.
12. Calculate the test statistic and the  $P$ -value.
13. What do you conclude about the manufacturer's claim? Explain.
14. Based on this sample, construct and interpret a 90% confidence interval for the proportion of yellow M&M candies produced by Mars.