Helping smokers to quit continues to be a very important and challenging public health goal. In a recent study of the effectiveness of a nicotine lozenge, smokers who wanted to quit were randomly assigned to one of two groups: one group received nicotine lozenges and the other group received placebo lozenges. The subjects were compared on various background variables at the beginning of the study, and at the end of the study they were compared on whether or not they successfully abstained from smoking.

a) Identify the observational units, explanatory variable, and response variable.

b) State the appropriate hypotheses for testing whether the data provide strong evidence that the nicotine lozenge is more effective than the placebo lozenge.

At the end of the 52-week study, 17.9% of the 459 subjects in the nicotine group had successfully abstained from smoking, compared to 9.6% of the 458 subjects in the placebo group.

c) Calculate (by hand) the test statistic and \( p \)-value.

d) Summarize your conclusion, using the .01 significance level.

e) Is it legitimate to draw a cause-and-effect conclusion between the nicotine lozenge and the increased rate of abstaining from smoking? Explain.

f) Produce a 99% confidence interval for the difference in population proportions who abstaining from smoking between the two groups.

g) Interpret this confidence interval.

h) Comment on whether the confidence interval is consistent with your hypothesis test conclusion.

i) Now consider only the subjects that received nicotine lozenges. Produce a 95% confidence interval to estimate the population proportion who would successfully abstain from smoking for 52 weeks when using the nicotine lozenge. Also interpret this interval.