1. In all sections of this problem, imagine that the average age in the US population is actually 45 years and that the population standard deviation equals the standard deviation given for the AGE variable on the computer output that you obtained in doing problem 2 of Lab 5.

   a. From among all possible samples of the size of the National Opinion Research Center's survey, what is the probability that NORC would have found an estimate of the average age in the U.S. population that is larger than the mean they actually did find?

   b. Assume that your objective is to determine whether the average age of Americans is under 46. If you use the .01 level of significance, what is the probability of your making a Type II error?

   c. Redo part b, except this time assume that your sample size is twice the size of the NORC sample. How does the probability of a Type II error in this case compare to that computed in part b?

2. China's government has been successful in enforcing the Maoist philosophy that men and women should participate equally in the labor force. During the forty years between 1954 and 1994, the role of "traditional Chinese housewife" virtually disappeared as an option for women of working age. Yet China is a country in which women have traditionally held lower-status jobs than men. You are interested in investigating whether the recent influx of women in the Chinese work force has improved or hindered women's job status. In an obscure archive in Beijing you find census data (i.e., data on all Chinese people) that show 80% of all Chinese working women to have had blue collar (i.e., lower-status) jobs in 1954.

   a. State your null and alternative hypotheses.

   b. Using the .05 level of significance, how large a sample would be required to reject the null hypothesis when there is more than a 10% difference between the percent in 1954 of Chinese working women with blue collar jobs and the percent as estimated in 1994?

   c. If in 1994 the true percent of Chinese working women with blue collar jobs was actually 70%, what would be the probability that a Type II error would be made in testing the hypotheses in part a with a sample of the size determined in part b?
d. Again, assuming that in 1994 the true percent of Chinese working women with blue collar jobs was actually 70%, what would be the probability that a random sample of 10 Chinese working women would have nine or more blue collar workers? (Show your work!)

e. Assume that a sample of 350 Chinese working women was used in testing the hypotheses in part a. What would be the p-value associated with the finding that 266 women in your sample have blue collar jobs?

3. According to Expectations Theory, people expect that one will be harmed in dangerous situations, but not in safe situations. Therefore, people believe "one's choice to be in a dangerous situation" leaves one responsible (i.e., at fault) for whatever harm one might experience at the time. In contrast, when one chooses to be in a safe situation, people will not believe one responsible for any harm one might then experience. (Note: The theory says nothing about the situations in which people actually are harmed, only about peoples' expectations of harm in various situations and about their consequent assignment of fault to victims and assailants.)

During the last 20 years Newsday (a newspaper in Long Island, New York) published 2680 editorials related to cases of "a male's sexual assault of a female." From these, you randomly sample 212 editorials, and evaluate each on whether it depicts the assault as the female's or the male's fault. In addition, you determine whether the assault took place in an area with a relatively high or a relatively low crime rate. Your data are as follows:

- 39 editorials depicted an assault in a low crime area as the male's fault
- 104 editorials depicted an assault in a high crime area as the male's fault
- 13 editorials depicted an assault in a low crime area as the female's fault
- 56 editorials depicted an assault in a high crime area as the female's fault

a. What null and alternative hypotheses would be used in a statistical test of Expectations Theory? (Hint: Evaluation of these hypotheses will require that you choose to evaluate whether either males or females [but not both] were depicted as at fault in the assaults.)

b. Test the hypotheses in part a at the .05 significance level. (Hint: Do NOT use a chi-square test!)
c. State your conclusion in words. That is, do your data provide support for Expectations Theory? Explain your answer.

d. Let's assume that if you were to have examined all of the 2680 Newsweek editorials, you would have found the following:

- 507 editorials depicted an assault in a low crime area as the male's fault
- 1218 editorials depicted an assault in a high crime area as the male's fault
- 143 editorials depicted an assault in a low crime area as the female's fault
- 812 editorials depicted an assault in a high crime area as the female's fault

What is the power of the hypothesis test performed in part b?