Chapter 11 FRAPPY!

Directions: Show all your work. Indicate clearly the methods you use, because you will be scored on the correctness of your methods as well as on the accuracy and completeness of your results and explanations.

Two statistics students wanted to know if including additional information in a survey question would change the distribution of responses. To find out, they randomly selected 30 teenagers and asked them one of the following two questions. Fifteen of the teenagers were randomly assigned to answer Question A, and the other 15 students were assigned to answer Question B.

> **A:** When choosing a college, how important is a good athletic program: very important, important, somewhat important, not that important, or not important at all?

> **B:** It's sad that some people choose a college based on its athletic program. When choosing a college, how important is a good athletic program: very important, important, somewhat important, not that important, or not important at all?

The table below summarizes the responses to both questions. For these data, the chi-square test statistic is $\chi^2 = 6.12$.

	Question A	Question B	Total
Very important	7	2	9
Important	4	3	7
Somewhat important	2	3	5
Not that important	1	2	3
Not important at all	1	5	6
Total	**15**	**15**	**30**

(a) State the hypotheses that the students are interested in testing.

(b) Describe a Type I error and a Type II error in the context of the hypotheses stated in part (a).

(c) For these data, explain why it would *not* be appropriate to use a chi-square distribution to calculate the *P*-value.

(d) To estimate the *P*-value, 100 trials of a simulation were conducted, assuming that the additional information didn't have an effect on the response to the question. In each trial of the simulation, the value of the chi-square statistic was calculated. These simulated chi-square statistics are displayed in the dotplot below.

Simulated chi-square statistic
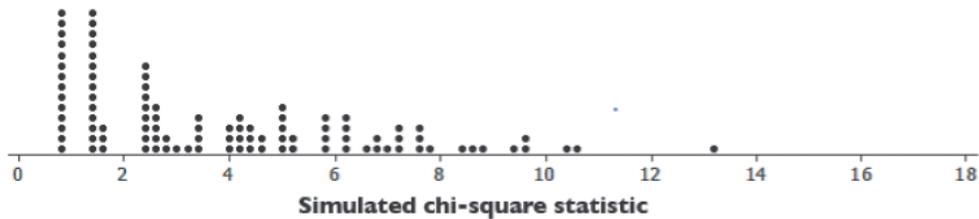
Based on the results of the simulation, what conclusion would you make about the hypotheses stated in part (a)?