

Seeing Red V

Let's start with a brief recap of what happened in previous activities. In **Seeing Red I**, you were told about the library staff's plan to implement a new security system that utilizes colored adhesive tags. The staff determined that red is the preferred color for the security tag because it provides the greatest contrast with the exterior of the book for the greatest possible number of colors. Since red is ineffective as a theft deterrent for books that have red covers, the staff plans to use white security tags on books with red covers.

In **Seeing Red III**, your class produced an estimate of the overall proportion of red books in the school library by combining the results of several samples into one very large sample. In **Seeing Red IV**, the school librarian made a claim about the actual proportion of red books in the library. (Your teacher will remind you of the librarian's original claim and the class estimate.) Then you used simulation to evaluate whether the librarian's claim seemed plausible based on the class estimate. In this activity, you will use more a formal inference procedure to make a decision about the librarian's claim. Along the way, you will be asked to identify potential errors you might make in the decision making process and the consequences of each. Be sure to consider the cost of the security tags: the price per 5000 tags is \$1900.00, the price per 1000 tags is \$450.00, and the price per 100 tags is \$72.00.

State hypotheses appropriate for a test to determine if there is convincing evidence that the proportion of red books in the library is greater than the librarian's claimed value

Describe a Type I and a Type II error in this setting and discuss the potential consequences of each.

Based on your analysis of possible errors and their consequences, choose one of the following significance levels to use in carrying out a test: $\alpha = 0.01$, 0.05 , or 0.10 . Justify your choice.

Carry out a test of the librarian's claim using the hypotheses and the significance level you chose earlier. Be sure to state your conclusion in the context of the problem.