

The New Deal and Random Guessing

Directions: This final problem spans the next two pages. 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.

Every year, each student in a nationally representative sample is given tests in various subjects. Recently, a random sample of 9,600 twelfth-grade students from the United States were administered a multiple-choice United States history exam. One of the multiple-choice questions is below. (The correct answer is C.)

In 1935 and 1936 the Supreme Court declared that important parts of the New Deal were unconstitutional. President Roosevelt responded by threatening to

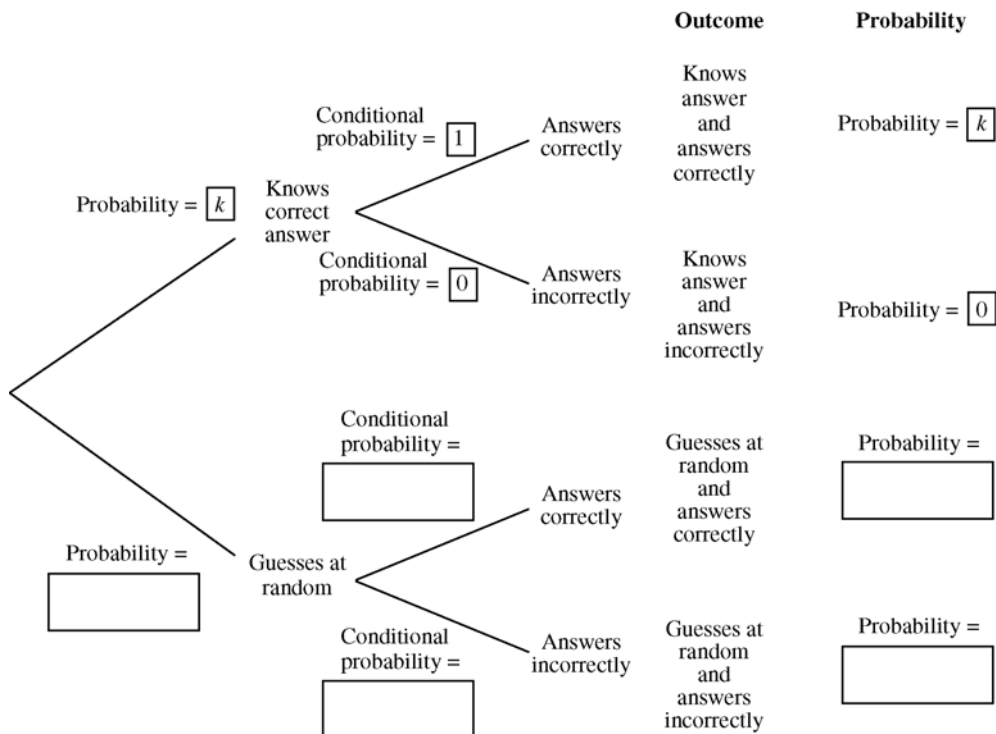
- (A) impeach several Supreme Court justices
- (B) eliminate the Supreme Court
- (C) appoint additional Supreme Court justices who shared his views
- (D) override the Supreme Court's decisions by gaining three-fourths majorities in both houses of Congress

Of the 9,600 students, 28 percent answered the multiple-choice question correctly.

- (A) Let p be the proportion of all United States twelfth-grade students who would answer the question correctly. Construct and interpret a 99 percent confidence interval for p .

Assume that students who actually know the correct answer have a 100 percent chance of answering the question correctly, and students who do not know the correct answer to the question guess completely at random from among the four options. **Let k represent the proportion of all United States twelfth-grade students who actually know the correct answer to the question.**

(B) A tree diagram of the possible outcomes for a randomly selected twelfth-grade student is provided below. Write the correct probability in each of the five empty boxes. Some of the probabilities may be expressions in terms of k .



(C) Based on the completed tree diagram, express the probability, in terms of k , that a randomly selected twelfth-grade student would correctly answer the history question.

(D) Using your interval from part (a) and your answer to part (c), calculate and interpret a 99 percent confidence interval for k , the proportion of all United States twelfth-grade students who actually know the answer to the history question. You may assume that the conditions for inference for the confidence interval have been checked and verified.