"FRAPPY"

{Free Response AP Problem...Yay!}

2010B
Problem 3

The following problem is taken from an actual Advanced Placement Statistics Examination. Your task is to generate a complete, concise statistical response in 15 minutes. You will be graded based on the AP rubric and will earn a score of 0-4. After grading, keep this problem in your binder for your AP Exam preparation.

A test consisting of 25 multiple-choice questions with 5 answer choices for each question is administered. For each question, there is only 1 correct answer.

Scoring:

(a) Let *X* be the number of correct answers if a student guesses randomly from the 5 choices for each of the 25 questions. What is the probability distribution of *X*?

E   P   I

This test, like many multiple-choice tests, is scored using a penalty for guessing. The test score is determined by awarding 1 point for each question answered correctly, deducting 0.25 point for each question answered incorrectly, and ignoring any question that is omitted. That is, the test score is calculated using the following formula.

Score = (1 x number of correct answer) - (0.25 x number of incorrect answers) + (0 x number of omits)

For example, the score for a student who answers 17 questions correctly, answers 3 questions incorrectly, and omits 5 questions is

Score = (1 x 17) - (.25 x 3) + (0 x 5) = 16.25.

(b) Suppose a student knows the correct answers for 18 questions, answers those 18 questions correctly, and chooses randomly from the 5 choices for each of the other 7 questions. Show that the expected value of the student's score is 18 when using the scoring formula above.

E   P   I

(c) A score of at least 20 is needed to pass the test. Suppose a student knows the correct answers for 18 questions, answers those 18 questions correctly, and chooses randomly from the 5 choices for each of the other 7 questions. What is the probability that the students will pass the test?

E   P   I   **Total:___/4**