You may use the front flap and appendices of your textbook for this quiz.

I. A multiple-choice test has twenty questions, each with 5 possible answers. Suppose a student randomly guesses the answer to each question on the test. Let the random variable X be the number of questions the student answers correctly. Please answer the following (10 points total):

(a) How is the random variable X distributed? You should give the name of the distribution and the value(s) of any relevant parameter(s) of the distribution. (3 points)

(b) What is the probability that the student will get the correct answer for at least 50% of the questions on the test? Be sure to write this probability in terms of the random variable X. (4 points)

(c) On average, how many questions will the student answer correctly via this random test taking method? (2 points)

II. Let X be a random variable and suppose that $E[X+5]=13$ and $E[(X+5)^2]=200$. Please find the following: (5 points total)

(a) $Var[X+5]$. (Hint: Let $Y = X + 5$ and find the variance of Y.)

(b) μ_X (the mean of X).

III. Use the moment generating function of the binomial distribution with parameters n and p to show that the mean of the distribution is np. (4 points)