

Answer on Question #55733 – Math – Statistics and Probability

You find that there are 72 multiple-choice questions with three possible responses (A, B, or C) for each, where only one is correct. The passing grade is set at 50%. Unluckily for you, you haven't been to a single class before this, nor have you ever opened the textbook. Actually, you can't even say for sure who the guy is at the front of the class. You will have to guess the answer on all the questions. What is the probability that you will pass the exam?

Solution

Probability that 36 questions were answered correctly is

$$p(36) = C_{72}^{36} \left(\frac{1}{3}\right)^{36} \left(\frac{2}{3}\right)^{36}.$$

Probability that 37 questions were answered correctly is

$$p(37) = C_{72}^{37} \left(\frac{1}{3}\right)^{37} \left(\frac{2}{3}\right)^{35}.$$

...

Probability that 72 questions were answered correctly is

$$p(72) = C_{72}^{72} \left(\frac{1}{3}\right)^{72} \left(\frac{2}{3}\right)^0.$$

Probability that you will pass an exam is

$$p = p(36) + p(37) + \dots + p(72) = \sum_{k=36}^{72} C_{72}^k \left(\frac{1}{3}\right)^k \left(\frac{2}{3}\right)^{72-k} = 0.002528.$$