

**Question #14649A** A professor of a law school observes that only 25% of students who get admitted to the freshman class reach fourth year. assuming that this is correct, among 15 randomly selected first year students, a. find the probability that exactly 8 will reach fourth year.

b. find the probability that at most 7 will reach fourth year.

c. find the probability that between 7 and 10, inclusive will reach fourth year.

d. find the expected number of students who will reach fourth year for the next 25 students. .

**Solution.** The condition implies that the probability for a particular student to reach the fourth course is 0.25. Next, let  $\xi$  be the random variable, that equals number of students out of 15 freshmen that reach the fourth course. Then it has binomial distribution  $Bin(15, 0.25)$ . Thus,

a)  $P(\xi = k) = \binom{15}{k} 0.25^k 0.75^{15-k} \approx 0.013$ .

b)  $P(\xi \leq 7) = \sum_{k=0}^7 \binom{15}{k} 0.25^k 0.75^{15-k} \approx 0.9827$ .

c)  $P(7 \leq \xi \leq 10) \approx 0.056$ .

d)  $E\xi = 15 \cdot 0.25 \approx 3.75$ .