

Answer on Question #38487 - Physics, Math - Statistics and Probability

Probability that randomly selected student is from the state equals to 0.75.

Let k be a random variable that equals to number of students among 10 that are from the state.

k has binomial distribution with parameters $p=0.75$, $n=10$. Then probability that 4 or more are from outside the state equals to

$$\begin{aligned} P(10 - k \geq 4) &= P(k \leq 6) = 1 - P(k \geq 7) = 1 - (P(k = 7) + P(k = 8) + P(k = 9) + P(k = 10)) \\ &= 1 - \left(0.75^{10} + 10 \cdot 0.25 \cdot 0.75^9 + \frac{10 \cdot 9}{2} 0.25^2 0.75^8 + \frac{10 \cdot 9 \cdot 8}{6} 0.25^3 0.75^7 \right) \\ &= 0.224 \end{aligned}$$

To get this result using simulation you should do following:

- 1) Generate 10 random numbers from 0 to 1
- 2) Calculate number of numbers that are less than 0.75
- 3) Repeat steps 1-2 T times (T is a big number, 100000 for example) and calculate number of times where results in (2) is no more than 6.
- 4) Divide results of (3) by T .