PES University, Bangalore

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UE19CS203 – STATISTICS FOR DATA SCIENCE

Unit - 3 - Probability Distributions

QB SOLVED

Continuity Correction

Exercises for Section 4.11

1. Among the adults in a large city, 30% have a college degree. A simple random sample of 100 adults is chosen. What is the probability that more than 35 of them have a college degree?

   [Text Book Exercise – Section 4.11 – Q. No. 10 – Pg. No. 301]
   Solution:

   Let X be the number of people who have college degree.

   $X \sim Bin(n, p)$, where $n = 100, p = 0.30, np(1-p) = (100 * 0.3 * 0.7) = 21$.

   Since $np > 10$ and $np(1-p) > 10$, It follows central limit theorem that $X \sim N\big(np, np(1-p)\big)$, that is $X \sim N(30,21)$.

   So, X is approximately normally distributed with mean $\mu_X = 100(0.030) = 30$ and standard deviation $\sigma_X = \sqrt{100(0.3)(0.7)} = 4.5826$.

   To find the probability that the number of people is more than 35, the value 35 is excluded.
   So, find $P(X > 35.5)$. Compute z-score for 35.5

   $$z = \frac{35.5 - 30}{\sqrt{21}} = 1.20$$

   The area to the right of z = 1.20 is (1 – 0.8849) = 0.1151.

   $$(P > 35) = 0.1151.$$