

Probability and Statistics

Assignment -3 [15th Sep 2018]

Part 1: Using normal approximation, express the following probabilities in terms of normal distribution: (Use continuity correction). You can write the answers in terms of R-functions, $qnorm(\dots)$, $pnorm(\dots)$.

1. Let X have binomial distribution with $p = 0.5$ and $n = 64$. Find (i) : $P(X \leq 16)$, (ii) : $P(X \geq 40)$ and (iii) : $P(|X - 30| > 5)$.
2. Let X have binomial distribution with $p = 0.1$ and $n = 64$. Find (i) : $P(X \leq 3)$, (ii) : $P(X \geq 18)$ and (iii) : $P(|X - 4| > 3)$.
3. Let X have binomial distribution with $p = 0.3$ and $n = 64$. Find (i) : $P(X \leq 3)$, (ii) : $P(X \geq 18)$ and (iii) : $P(|X - 4| > 3)$.
4. Let Z have Poisson distribution with $\lambda = 25$. Find (i) : $P(Z \leq 30)$, (ii) : $P(Z \geq 40)$ and (iii) : $P(|Z - 30| > 5)$.
5. Let Z have Poisson distribution with $\lambda = 49$. Find (i) : $P(Z \leq 30)$, (ii) : $P(Z \geq 40)$ and (iii) : $P(|Z - 30| > 5)$.

Part 2: Using simulation, estimate the probabilities in each case in Part 1. (Using sample size 100000)

Part 3: Using R: Compute the exact probabilities in each case in Part 1. (using built in functions in R)

Check as to in how many cases (out of 15) did the simulation estimate do better than the normal approximation.