

1. Let X_1, X_2, \dots, X_n be independent identically distributed random variables with density function

$$f(x) = \begin{cases} 1 & \text{if } x \in (0, 1) \\ 0 & \text{if } x \notin (0, 1). \end{cases}$$

Approximate $P(\sum_{i=1}^{20} X_i \leq 12)$ in terms of $\Phi(\cdot)$, the cdf of a standard normal.