

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.

$$P\left(\frac{\sum X_i - 10}{\sqrt{\frac{20}{12}}} \leq \frac{12 - 10}{\sqrt{\frac{20}{12}}}\right) \approx \Phi\left(\frac{2}{\sqrt{5/3}}\right)$$