What we want is

$$P(\text{succeed at least once}) = 1 - P(\text{never succeed}) \geq 1 - \frac{1}{n},$$

Which implies

$$P(\text{never succeed}) \leq \frac{1}{n}.$$

$$\begin{aligned} P(\text{never succeed}) &= P(\text{fail}) \times \text{times it run} \\ &= (1 - P(\text{succeed})) \times \text{times it run} \\ &= \left(1 - \frac{1}{n}\right) nk(n) \leq \frac{1}{n} \\ k(n) &\leq \frac{1}{n(n-1)} \end{aligned}$$

Thus choose $k(n)$ as $\frac{1}{n(n-1)}$ can satisfy the question.