4.4.1. $\mu_k = EX^k = \int_0^1 x^k dx = \frac{1}{k+1}$

$\nu_k = E(X-EX)^k = \int_0^1 (x-\frac{1}{2})^k dx = \int_{-\frac{1}{2}}^{\frac{1}{2}} (x-\frac{1}{2})^k d(x-\frac{1}{2})$

$= \begin{cases} 0,\ k\text{为奇数} \\ \frac{1}{(k+1)2^k},\ k\text{为偶数} \end{cases}$

4.4.3. $F(x) = \begin{cases} 0,\ x \le 0 \\ x,\ 0 < x \le 1 \\ 1,\ x > 1 \end{cases}$

显然, $x_\alpha = \alpha$

4.4.4. 查表得$\Phi(1.96) = 0.975$, 则有$\frac{x0.975-10}{2} = 1.96$, 解得$x_{0.975} = 13.92$

4.5.2. 设X_k表示第k次掷骰子的点数，$k = 1, 2, \ldots, 100, X_1, X_2, \ldots, X_{100}$独立同分布

$\mu = 3.5, \sigma \approx 1.708$

$P(300 \le \Sigma_{k=1}^1 00 X_k \le 400) = \Phi(\frac{400-100\times 3.5}{1.708\times 10}) - \Phi(\frac{300-100\times 3.5}{1.708\times 10}) = 2\Phi(2.93) - 1 = 0.9966$

4.5.3. 设X表示为正面的硬币数，则有$X \sim B(900, 0.5)$

$P(X \ge 495) = 1 - \Phi(\frac{495-0.5-450}{\sqrt{225}}) \approx 1 - \Phi(2.97) \approx 0.0015$

4.5.4. 设X表示为考生答对的题目数，则$X \sim B(100, 0.5)$

$P(X \ge 60) = 1 - \Phi(\frac{60-0.5-50}{5}) \approx 1 - \Phi(1.9) \approx 0.0287$