7. 解:

(1)

由题意知，

$$
\begin{aligned}
E(X) &= \sum_{i=1}^{3} x_i p_i = 1.29 \qquad (1)\\
E(X^2) &= \sum_{i=1}^{3} x_i^2 p_i = 1.713 \qquad (2)\\
D(X) &= E(X^2) - [E(X)]^2 = 0.0489 \qquad (3)
\end{aligned}
$$

故，对于 $Y = \sum_{i=1}^{n} x_i = 300$充分大，可以近似认为，

$$
\frac{Y-387}{\sqrt{14.67}} \sim N(0,1)
$$

故，

$$
P(Y \geq 400) = P(\frac{Y-387}{\sqrt{14.67}} \geq \frac{13}{\sqrt{14.67}}) \approx 1-\varphi(3.83) \approx 0.00641\%
$$

(2)

由于 $X \sim b(n, 0.2)$ 且 $n = 300$， 故可以近似认为，

$$
Y \sim P(\lambda = 300 \times 0.2 = 60)
$$

故，

$$
P(Y \geq 60) = \sum_{i=60}^{\infty} P(Y=i) = 1 - \mathrm{cdf}(60, 60) \approx 1 - 0.5343 = 0.4657
$$

11. 解:

(2)

由题意知， $E(X) = 5, D(X) = 0.3$, 故 $\overline{X} \sim N(5, \frac{0.3}{\sqrt{80}})$

同理，$\overline{Y} \sim N(5, \frac{0.3}{\sqrt{80}})$，$Z = \overline{X} - \overline{Y} \sim N(0, \frac{0.6}{\sqrt{80}})$

故，

$$P(-0.1 \leq Z \leq 0.1) = P(-2.991 \leq \frac{Z}{\sqrt{80}} \leq 2.991) \approx 2\varphi(2.991) - 1 = 0.9972$$