

MATH 461 Homework 11

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8.4

$$\begin{aligned}\mu &= \lambda = 1 \\ P\left\{\sum_{i=1}^{20} X_i \geq 15\right\} &\leq \frac{E(\sum X_i)}{15} = \frac{20}{15} = \frac{4}{3} \\ P\left\{\sum_{i=1}^{20} X_i \geq 15\right\} &= P\left\{\sum_{i=1}^{20} X_i - 20 \geq 15 - 20\right\} P\left\{\sum_{i=1}^{20} X_i \geq 15\right\} \\ &= P\{Z \geq -1.18\} \\ &= 0.86\end{aligned}$$

8.5

$$\begin{aligned}\mu &= \frac{0.5 - 0.5}{2} = 0 \\ \sigma^2 &= \frac{(-0.5 - 0.5)^2}{12} = \frac{1}{12} \\ P\left\{\left|\sum_{i=1}^{50} X_i\right| > 3\right\} &= 2 \times P\left\{\sum_{i=1}^{50} X_i > 3\right\} P\left\{\left|\sum_{i=1}^{50} X_i\right| > 3\right\} \\ &= 2 \times P\left\{\frac{\sum_{i=1}^{50} X_i - 50(0)}{\sqrt{50 \times \frac{1}{12}}} > \frac{3 - 50(0)}{\sqrt{50 \times \frac{1}{12}}}\right\} \\ &= 2 \times P\{Z > 1.47\} \quad P\left\{\left|\sum_{i=1}^{50} X_i\right| > 3\right\} \\ &= 2 \times 0.0708 = 0.1416\end{aligned}$$

8.7

$$P(S_{100} > 525) = 0.3085 \text{ by central limit theorem}$$

8.8

$$p = 0.6915$$

8.15

$$p = 0.0000884 \approx 0$$