

Section 1.2 review

1. Problem 1.2. This is an *application* of results from Section 1.2; do not re-derive mean, variance, and covariance formulas.
2. In Section 1.2.3, Agresti makes reference to a Poisson random variable with a mean of 100. Graph the probability mass function of a Poisson random variable with mean 100 using the package of your choice (**R** uses the command `dpois` to calculate the Poisson probability mass function; you should use `seq` in **R** to generate the support points). Overlay a normal curve with mean 100 and standard deviation 10 (You can do this in **R** using the `seq`, `dnorm` and `lines` commands).
3. In Section 1.2.2, the book states that the covariance of two multinomial counts n_j and n_k is $-n\pi_j\pi_k$. Justify the steps in the following proof:

$$\begin{aligned} Cov(n_j, n_k) &= Cov\left(\sum_i Y_{ij}, \sum_i Y_{ik}\right) \\ &= \sum_i \sum_{i'} Cov(Y_{ij}, Y_{i'k}) \\ &= \sum_i Cov(Y_{ij}, Y_{ik}) \\ &= \sum_i (E(Y_{ij}Y_{ik}) - E(Y_{ij})E(Y_{ik})) = -n\pi_j\pi_k \end{aligned}$$