1. Roll two 6-sided dice. Let $X$ denote the minimum value, and let $Y$ denote the maximum value.
   1a. Find the covariance of $X$ and $Y$.
   1b. Find the correlation of $X$ and $Y$.

2. Suppose that 6 students come to a party, and each of them brings their favorite CD with them. (For convenience, assume that they each have a different favorite CD.) As they leave the party, they take a CD at random as they depart. Let $X$ denote the number of students who get their own CD back. Find $\text{Var}(X)$.

3. Draw 5 cards from a 52 card deck (without replacement).
   3a. Let $X$ denote the number of Hearts that appear. Find $\mathbb{E}(X)$ and also $\text{Var}(X)$.
   3b. Let $Y$ denote the number of Queens that appear. Find $\mathbb{E}(Y)$ and also $\text{Var}(Y)$.
   3c. Find the covariance of $X$ and $Y$.

4. Consider a pair of random variables $X, Y$ with constant joint density on the quadrilateral with vertices located at the points $(0, 0), (3, 0), (5, 2), (0, 2)$.
   4a. Find the covariance of $X$ and $Y$.
   4b. Find the correlation of $X$ and $Y$.

5. Suppose that $X$ and $Y$ have a constant joint density on the triangle with vertices $(0, 0), (3, 0), (0, 3)$.
   5a. Find the covariance of $X$ and $Y$.
   5b. Find the correlation of $X$ and $Y$.

6. Suppose $X$ and $Y$ have joint probability density function
   \[ f_{X,Y}(x, y) = 60e^{-4x-6y} \]
   for $0 < x < y$; and $f_{X,Y}(x, y) = 0$ otherwise. We already saw, on Midterm Exam #2, that $\mathbb{E}(X) = 1/10$.
   6a. Find $\mathbb{E}(Y)$.
   6b. Find $\mathbb{E}(XY)$.
   6c. Use what you know to find the covariance of $X$ and $Y$. 