1. The coefficient of variation (CV) for a positive random variable $X$ is defined as $CV(X)=sd(X)/E(X)$.
   (a; 8 points) Prove that for any $a > 0$, $CV(aX) = CV(X)$. Show your work.
   (b; 12 points) Compute $CV(X)$ for a random variable $X$ with density (pdf) $f(x) = 3x^2, 0 \leq x \leq 1$. Show your work.

2. (20 points) Consider rolling two fair dice. Compute the covariance between the sum and the difference of the two outcomes? Show your work.

3. Let $X$ be uniformly distributed on the interval $(a,b)$, i.e., $f_X(x) = (b-a)^{-1}, a < x < b$.
   (a; 10 points) Compute $P(E(X) - sd(X) \leq X \leq E(X) + sd(X))$. Show your work.
   (b; 10 points) What does the Bienaymé-Chebyshev inequality yield for the probability in (a)? Compute the bound, and comment on its quality. Show your work.