Question 1

4 pts

Let X be a random variable with $Var(X) = 18$. Find $Var\left(4 + \frac{X}{3}\right)$.

Question 2

4 pts

Let X_1, X_2, and X_3 be independent random variables with $Var\,(X_1) = 1$, $Var\,(X_2) = 3$ and $Var\,(X_3) = 5$. Find variance of $\frac{1}{3}(X_1 + X_2 + X_3)$.

Question 3

4 pts

Let X and Y be independent random variables with $Var(X) = 5$ and $Var(Y) = 4$. Find $\mathrm{SD}(X - Y)$.

Question 4

4 pts

Let (X, Y) be uniformly distributed over the region $[0, 1] \times [0, 2]$, i.e. the joint probability density function (joint pdf) of X and Y is

$$f_{X,Y}(x, y) = \begin{cases} \frac{1}{2}, & \text{if } (x, y) \in [0, 1] \times [0, 2], \\ 0, & \text{otherwise.} \end{cases}$$

Find $\mathrm{Cov}(X, Y)$.

Question 5

4 pts

Let X be a random variable with $Var(X) = 10$. Let now $Y = 2 + 3X$. Find correlation $\rho_{X,Y}$.