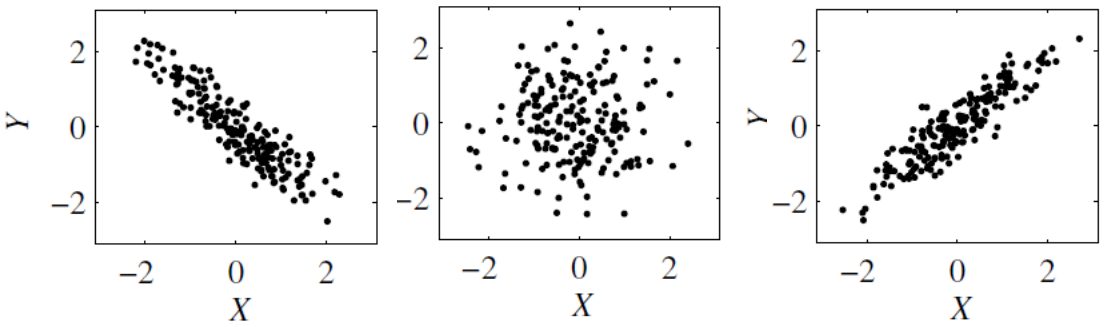
Question 1:

Random variables X and Y are such that X has expected value $\mu_X = 0$ and standard deviation $\sigma_X = 3$, while Y has mean of $\mu_Y = 1$ and standard deviation of $\sigma_Y = 4$. In addition, X and Y have covariance $C_{XY} = -3$. Find the expected value and variance of $W = 2X + 2Y$.

Question 2:

Consider the three scatter plots of random variables (X, Y) shown in Figures (a), (b) and (c). Suppose the correlation coefficients for the three pairs of X and Y are $\rho_{XY} = 0$, $\rho_{XY} = 0.9$ and $\rho_{XY} = -0.9$, but we do not know which one belongs to what pair. State which correlation coefficient corresponds to which scatter plot.



(a) (b) (c)

Question 3:

Two random variables X and Y have joint PDF given by

$$f_{XY}(x,y) = \begin{cases} \frac{1}{2}, & -1 \le x \le y \le 1, \\ 0, & \text{elsewhere.} \end{cases}$$

(a) Sketch the region of possible pairs (x, y).

(b) Show that X and Y are orthogonal, that is, $E[XY] = 0$, but they are not independent, that is $C_{XY} \neq 0$