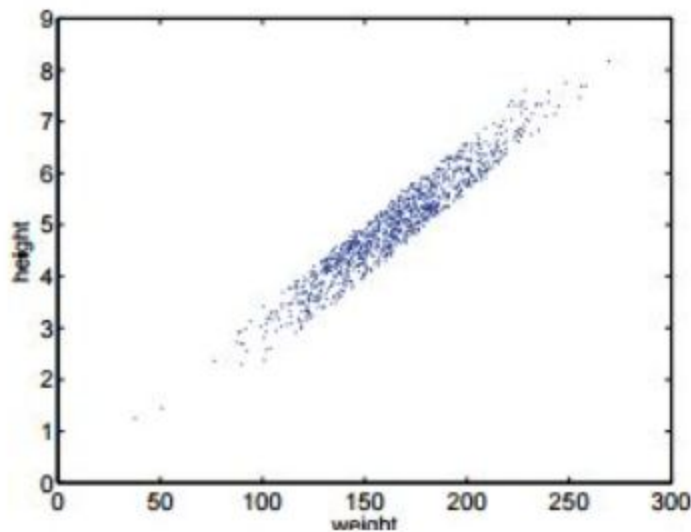


1. What are Eigen values and Eigen vectors for this matrix $\begin{bmatrix} -6, 3 \\ 4, 5 \end{bmatrix}$
2. How can we prove that $AV = \lambda V$ (A is a matrix and λ is eigen value and V is eigen vector)
3. By seeing this plot between height and weight which angle has maximum possible variance of data?



- A. ~ 0 degree
 - B. ~ 45 degree
 - C. ~ 60 degree
 - D. ~ 90 degree
4. How first principle component axis is selected in PCA?
 5. Given matrix $[A]$ and has an eigenvalue of 4 with the corresponding eigenvectors as $[X]$

$$[A] = \begin{bmatrix} 8 & -4 & 2 \\ 4 & 0 & 2 \\ 0 & -2 & -3 \end{bmatrix} \quad [x] = \begin{bmatrix} -4.5 \\ -4 \\ 1 \end{bmatrix}, \text{ then } [A]^5 [X] \text{ is}$$

$$(A) \begin{bmatrix} -18 \\ -16 \\ 4 \end{bmatrix}$$

$$(B) \begin{bmatrix} -4.5 \\ -4 \\ 1 \end{bmatrix}$$

$$(C) \begin{bmatrix} -4608 \\ -4096 \\ 1024 \end{bmatrix}$$

$$(D) \begin{bmatrix} -0.004395 \\ -0.003906 \\ 0.0009766 \end{bmatrix}$$

6. For this array([[1, 4], [3, 2], [5, 6]]) of elements calculate SVD and print U, Sigma, and V^T matrices.

7. Two coins are tossed, find the probability that two heads are obtained. Note: Each coin has two possible outcomes H (heads) and T (Tails).

8. Which of these numbers cannot be a probability?

- a) -0.00001
- b) 0.5
- c) 1.001
- d) 0

9. A die is rolled and a coin is tossed, find the probability that the die shows an odd number and the coin shows a head.

10. Given two variables with : $\text{Var}(X) = 25$, $\text{Var}(Y) = 16$, also, the correlation between X and Y is -0.5, calculate $\text{Cov}(X, Y)$, $\text{Cov}(2X, 3Y)$, $\text{Var}(X+Y)$ and $\text{Var}(2X + 3Y)$?