

# SMAI-M20-02,03: Review Questions

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## Review Question (one, none or more correct)

We are given a set of 2D points from two classes, as shown in the Figure.

Q: To make the computations efficient, we want to do a dimensionality reduction from 2D to 1 D with the help of a  $1 \times 2$  matrix  $\mathbf{W}$

$$\mathbf{x}' = \mathbf{W}\mathbf{x}$$

What should be the  $\mathbf{W}$  matrix be in this case?

(Indeed the goal is to get good classification performance in the new feature space  $\mathbf{x}'$ , while the computations could be efficient)

(a)  $[1, 0]$  (b)  $[-1, 0]$  (c)  $[2, 0]$  (d)  $[1, 1]$  (e)  $[0, 1]$  (f)  $[0, -1]$  (g)  $[1, 0]^T$

## Review Question (one, none or more correct)

We are given a set of 2D points from two classes, as shown in the Figure. We want to “rotate” the data so that points are spread across first (x) axis (i.e., something like rotate clockwise by  $45^\circ$ )

$$\mathbf{x}' = \mathbf{W}\mathbf{x}$$

What should be the  $2 \times 2$  matrix  $\mathbf{W}$  be in this case?

- (a)  $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  (b)  $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$  (c)  $\begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$  (d)  $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$  (e)  $\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$   
(f)  $\begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$  (g) Any one of the above (h) None of the above

## Review Question (one, none or more correct)

What is the probability that, in a room of 30 people, there is a pair of people who have the same birthday. (use calculator, pick the closest)  
(a) 0.11 (b) 0.31 (c) 0.51 (d) 0.71 (e) 0.91

## Review Question

What is the angle between the two lines characterized by

$$\mathbf{w}_1 = [1, 1]^T$$

$$\mathbf{w}_2 = [1, -1]^T$$

(a) 0 (b) 45 (c) 90 (d) 120

## Review Question

We stop two people at random. What is the probability that they were born on the same day of the week?

(a)  $\frac{1}{7}$  (b)  $\frac{1}{7^2}$  (c)  $\frac{1}{7+7}$  (d)  $\frac{1}{2}$  (e) None of the above