

# SMAI-M20-Lec 23 Review questions

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

- 0.1 Let  $\mathbf{p} = [p_1, p_2]^T$  and  $\mathbf{q} = [q_1, q_2]^T$  be two vectors in 2D.  
 $\kappa(\cdot, \cdot)$  is a kernel and  $\phi()$  is the corresponding feature map.  
Let  $z = \kappa(\mathbf{p}, \mathbf{q}) = (\mathbf{p}^T \mathbf{q})^2$ .
- 0.1.1  $z$  is scalar.
  - 0.1.2  $z$  is unique for the given  $\kappa()$ .
  - 0.1.3  $\phi()$  is unique given the  $\kappa()$ .
  - 0.1.4  $\phi() \in R^2$ .
  - 0.1.5 All the above.

Ans: AB

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

Let  $\mathbf{p} = [p_1, p_2]^T$  and  $\mathbf{q} = [q_1, q_2]^T$  be two vectors in 2D.

$\kappa(\cdot, \cdot)$  is a kernel and  $\phi()$  is the corresponding feature map.

Let  $\kappa() = \sum_{i=1}^P \kappa_i()$ . Then the  $\phi()$  is

1.  $\sum_{i=1}^P \phi_i()$
2.  $\prod_{i=1}^P \phi_i()$
3.  $\phi()$  is obtained by concatenating  $\phi_i()$ s.
4. There is no analytical relationship between  $\phi()$  and  $\phi_i()$ s.
5. None of the above.

Ans: C

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

Let  $\mathbf{p} = [p_1, p_2]^T$  and  $\mathbf{q} = [q_1, q_2]^T$  be two vectors in 2D.

$\kappa(\cdot, \cdot)$  is a kernel and  $\phi()$  is the corresponding feature map.

If  $\phi(\mathbf{z}) = [z_1^2, z_2^2, \sqrt{2}z_1z_2]^T$  then  $\kappa(\mathbf{p}, \mathbf{q})$  is:

1.  $\mathbf{p}^T \mathbf{q}$
2.  $(\mathbf{p}^T \mathbf{q})^2$
3.  $(\mathbf{p}^T \mathbf{q})^{\sqrt{2}}$
4.  $(1 + \mathbf{p}^T \mathbf{q})^2$
5. None of the above.

Ans: B

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

Let  $\mathbf{p} = [p_1, p_2]^T$  and  $\mathbf{q} = [q_1, q_2]^T$  be two vectors in 2D.  
 $\kappa(\cdot, \cdot)$  is a kernel and  $\phi()$  is the corresponding feature map.  
If  $\phi(\mathbf{z}) = [z_1^2, z_2^2, z_1 z_2, z_2 z_1]^T$  then  $\kappa(\mathbf{p}, \mathbf{q})$  is:

1.  $\mathbf{p}^T \mathbf{q}$
2.  $(\mathbf{p}^T \mathbf{q})^2$
3.  $(\mathbf{p}^T \mathbf{q})^{\sqrt{2}}$
4.  $(1 + \mathbf{p}^T \mathbf{q})^2$
5. None of the above.

Ans: B

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

Let  $\mathbf{p} = [p_1, p_2]^T$  and  $\mathbf{q} = [q_1, q_2]^T$  be two vectors in 2D.  
 $\kappa(\cdot, \cdot)$  is a kernel and  $\phi()$  is the corresponding feature map.  
If  $\phi(\mathbf{z}) = [z_1^2, z_2^2, \sqrt{2}z_1z_2, \sqrt{2}z_1, \sqrt{2}z_2, 1]^T$  then  $\kappa(\mathbf{p}, \mathbf{q})$  is:

1.  $\mathbf{p}^T \mathbf{q}$
2.  $(\mathbf{p}^T \mathbf{q})^2$
3.  $(\mathbf{p}^T \mathbf{q})^{\sqrt{2}}$
4.  $(1 + \mathbf{p}^T \mathbf{q})^2$
5. None of the above.

Ans: D