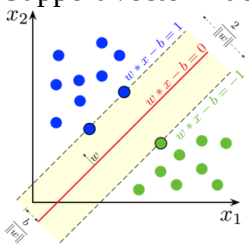
1. Support vector machine is shown by image below



   Ans b
2. General structure of a hyperplane is

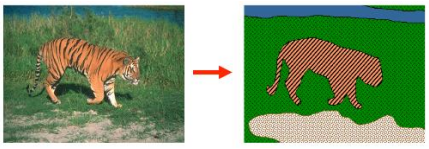
$$\bar{\mathbf{a}}^T\bar{\mathbf{x}} = b$$

   Ans b
3. General structure of a halfspace is

$$\bar{\mathbf{a}}^T\bar{\mathbf{x}} \geq b$$

   Ans d
4. The modified optimization problem for linear classification Separates both classes by a **slab**

   Ans a
5. Image segmentation is



   Ans d
6. The **margin** between two hyperplanes is

$$\frac{|c_1 - c_2|}{\|\bar{\mathbf{a}}\|}$$

   Ans d
7. The distance between the two hyperplanes given below

$$x_1 + \sqrt{2}x_2 + \sqrt{3}x_3 + \cdots + \sqrt{N}x_N = 1$$
$$x_1 + \sqrt{2}x_2 + \sqrt{3}x_3 + \cdots + \sqrt{N}x_N = -1$$

   The distance is

$$\frac{1-(-1)}{\sqrt{1+2+\cdots+N}} = \frac{2}{\sqrt{\frac{N(N+1)}{2}}} = \frac{2\sqrt{2}}{\sqrt{N(N+1)}}$$

   Ans b
8. SVM can be imported for classification in PYTHON as
   from sklearn.svm import SVC
   Ans c
9. Kernel SVM with sigmoid kernel can be loaded in PYTHON as
   ksvmc = SVC(kernel = 'sigmoid', random_state = 0)
   Ans c
10. The optimization problem to determine the support vector classifier is

$$\min\|\bar{\mathbf{a}}\|_2$$
$$\boldsymbol{C_0}: \bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \geq 1,\ 1 \leq i \leq M$$
$$\boldsymbol{C_1}: \bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \leq -1,\ M+1 \leq i \leq 2M$$

    Ans c