4.

$$\left\{ \binom{1}{10}, \binom{1}{6}, \binom{4}{11}, \binom{6}{1}, \binom{7}{6}, \binom{10}{4} \right\}$$

The support vectors $\binom{1}{6}, \binom{4}{11}, \binom{7}{6}$

we will add one for the bias:

$$S_1 = \begin{pmatrix} 1 \\ 6 \\ 1 \end{pmatrix} \qquad S_2 = \begin{pmatrix} 4 \\ 11 \\ 1 \end{pmatrix} \qquad S_3 = \begin{pmatrix} 7 \\ 6 \\ 1 \end{pmatrix}$$

$$\alpha_1 \, S_1 S_1 + \alpha_2 \, S_2 S_1 + \alpha_3 \, S_3 S_1 = -1$$

$$\alpha_1 \, S_1 S_2 + \alpha_2 \, S_2 S_2 + \alpha_3 \, S_3 S_2 = -1$$

$$\alpha_1 \, S_1 S_3 + \alpha_2 \, S_2 S_3 + \alpha_3 \, S_3 S_3 = 1$$

$$\overset{\shortparallel}{\vee}$$

$$\alpha_1 \begin{pmatrix} 1 \\ 6 \\ 1 \end{pmatrix}\begin{pmatrix} 1 \\ 6 \\ 1 \end{pmatrix} + \alpha_2 \begin{pmatrix} 4 \\ 11 \\ 1 \end{pmatrix}\begin{pmatrix} 1 \\ 6 \\ 1 \end{pmatrix} + \alpha_3 \begin{pmatrix} 7 \\ 6 \\ 1 \end{pmatrix}\begin{pmatrix} 1 \\ 6 \\ 1 \end{pmatrix} = -1$$

$$\alpha_1 \begin{pmatrix} 1 \\ 6 \\ 1 \end{pmatrix}\begin{pmatrix} 4 \\ 11 \\ 1 \end{pmatrix} + \alpha_2 \begin{pmatrix} 4 \\ 11 \\ 1 \end{pmatrix}\begin{pmatrix} 4 \\ 11 \\ 1 \end{pmatrix} + \alpha_3 \begin{pmatrix} 7 \\ 6 \\ 1 \end{pmatrix}\begin{pmatrix} 4 \\ 11 \\ 1 \end{pmatrix} = -1$$

$$\alpha_1 \begin{pmatrix} 1 \\ 6 \\ 1 \end{pmatrix}\begin{pmatrix} 7 \\ 6 \\ 1 \end{pmatrix} + \alpha_2 \begin{pmatrix} 4 \\ 11 \\ 1 \end{pmatrix}\begin{pmatrix} 7 \\ 6 \\ 1 \end{pmatrix} + \alpha_3 \begin{pmatrix} 7 \\ 6 \\ 1 \end{pmatrix}\begin{pmatrix} 7 \\ 6 \\ 1 \end{pmatrix} = 1$$

$$\Downarrow$$

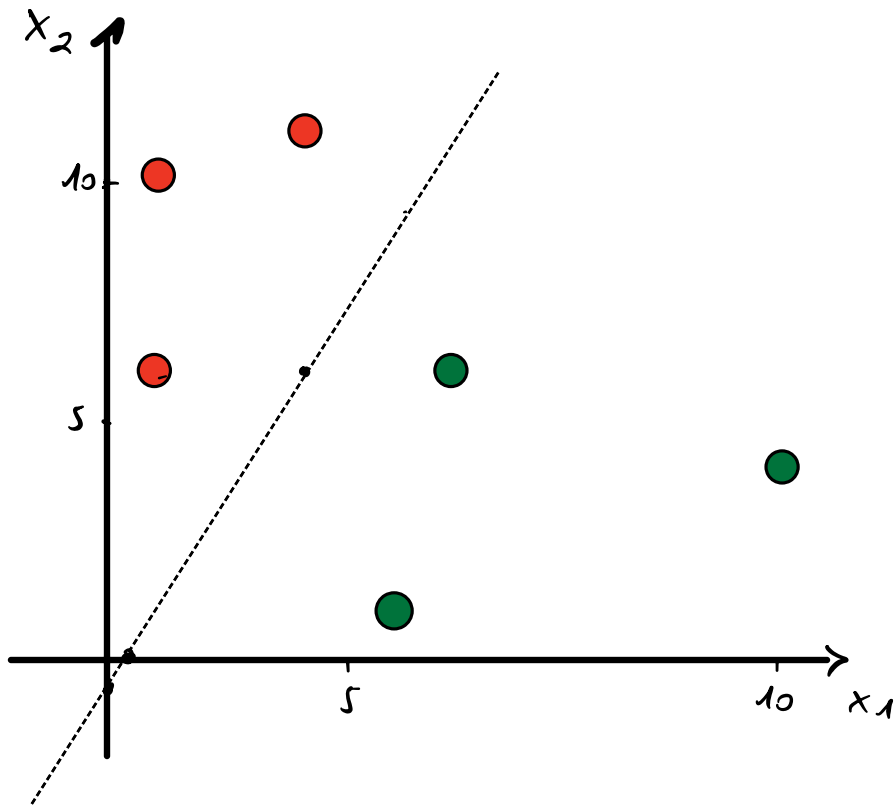$$\begin{cases} 38\alpha_1 + 71\alpha_2 + 44\alpha_3 = -1 \\ 71\alpha_1 + 138\alpha_2 + 95\alpha_3 = -1 \\ 44\alpha_1 + 95\alpha_2 + 86\alpha_3 = 1 \end{cases} \Rightarrow \quad \begin{aligned} \alpha_1 &= -0.271 \\ \alpha_2 &= 0.12 \\ \alpha_3 &= 0.017 \end{aligned}$$

$$-0.271\begin{pmatrix} 1 \\ 6 \\ 1 \end{pmatrix} + 0.12\begin{pmatrix} 4 \\ 11 \\ 1 \end{pmatrix} + 0.017\begin{pmatrix} 7 \\ 6 \\ 1 \end{pmatrix} = \begin{pmatrix} 0.328 \\ -0.204 \\ -0.134 \end{pmatrix}$$

Hyper plane $(0.328, -0.204)$ offset -0.134

$$\boxed{0 = 0.328x_1 - 0.204x_2 - 0.134}$$

$$\sqrt{w^{T} \cdot w} = \sqrt{(0.328, -0.204)\begin{pmatrix} 0.328 \\ -0.204 \end{pmatrix}} = \sqrt{0.148}$$

$$\text{Margin} = \frac{2}{\sqrt{0.148}} = \boxed{5.194}$$