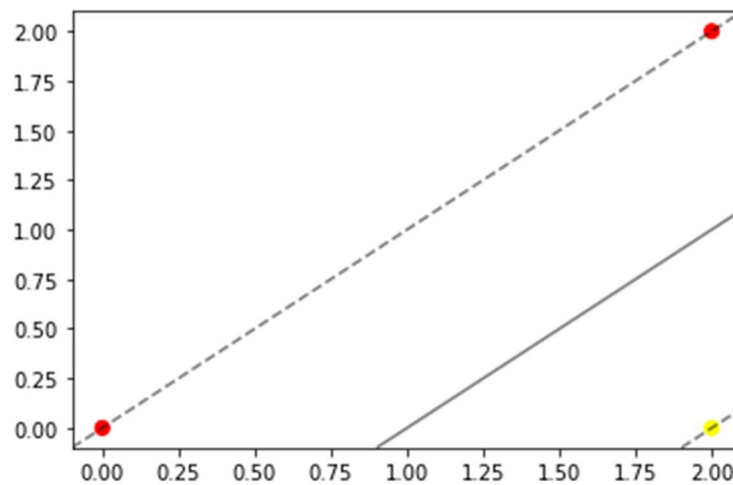


2.

$$\begin{aligned}
 \text{(a)} \quad & -1 \times (1.2 \times 0 + (-3.2) \times 0 + (-0.5)) = 0.5 \\
 & -1 \times (1.2 \times 2 + (-3.2) \times 2 + (-0.5)) = 4.5 \\
 & 1 \times (1.2 \times 2 + (-3.2) \times 0 + (-0.5)) = 1.9 \\
 & \rho = 0.5
 \end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad & \frac{1}{\rho}(b, w) = \frac{1}{0.5}(-0.5, \begin{bmatrix} 1.2 \\ -3.2 \end{bmatrix}) = (-1, \begin{bmatrix} 2.4 \\ -6.4 \end{bmatrix}) \\
 & -1 \times (2.4 \times 0 + (-6.4) \times 0 + (-1)) = 1 \\
 & -1 \times (2.4 \times 2 + (-6.4) \times 2 + (-1)) = 9 \\
 & 1 \times (2.4 \times 2 + (-6.4) \times 0 + (-1)) = 3.8
 \end{aligned}$$

(c)



$$\text{Distance} = \frac{y_n(w^T x_n + b)}{\|w\|} = \frac{-1 \times (2.4 \times 0 + (-6.4) \times 0 + (-1))}{\|w\|} = \frac{1}{\|w\|} = \frac{1}{\sqrt{2}} \cong 0.707$$

The margin is equal to $\frac{1}{\|w^*\|}$