Rojas Neural Networks Chapter 3

if $w_1 \dots w_{n+1}$ are real (but not necessarily rational)

then there exists some positive number u such that

$$u \cdot \sum_{i=1}^{n+1} j_i = \sum_{i=1}^{n+1} w_i$$ where j is a tuple of rational values

therefor,

given different values of $(x_1, x_2 \dots x_n) \in A, B$

for A, $\sum_{i=1}^{n} w_i \cdot x_i \geq w_{n+1} \Rightarrow \sum_{i=1}^{n} j_i \cdot x_i \geq \frac{w_{n+1}}{u}$

and for B, $\sum_{i=1}^{n} w_i x_i < w_{n+1} \Rightarrow \sum_{i=1}^{n} j_i \cdot x_i < \frac{w_{n+1}}{u}$

making the tuple of rational numbers j_i a valid set of weights to separate linearly separable sets A and B