§12.2 Vectors

＊Vector：

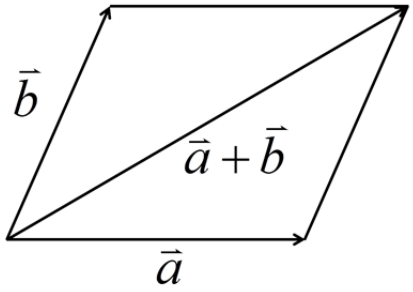
1. 幾何(物理)觀點：有長度、方向的量。

2. 代數觀點：$\overrightarrow{OP} =< a,b,c > \; P = (a,b,c)$

$$\text{長度} = |\overrightarrow{OP}| = \sqrt{a^2 + b^2 + c^2}.$$

3. 運算方式：

幾何：

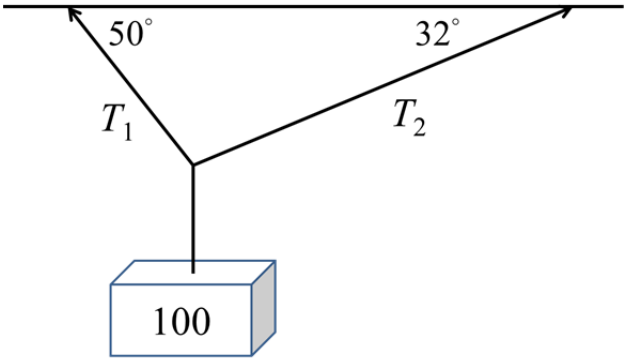


代數：$\vec{a} =< a_1, a_2, a_3 >,\ \vec{b} =< b_1, b_2, b_3 >$

$$\Rightarrow \vec{a} + \vec{b} =< a_1 + b_1, a_2 + b_2, a_3 + b_3 >.$$

Example 1：

A 100-*lb* weight hangs from two wires as shown below. Find the tension force T_1 and T_2 in both wires and their magnitudes.



Solution：

$$\begin{cases} |T_1|\sin 50° + |T_2|\sin 32° = mg \\ |T_1|\cos 50° = |T_2|\cos 32° \end{cases}$$

$$T_1 = \frac{100}{\sin 50° + \tan 32°\cos 50°} \cong 85.64lb$$

$$T_2 = \frac{|T_1|\cos 50°}{\cos 32°} \cong 64.91lb$$

$$|T_1| = (|T_1|\sin 50°)j - (|T_1|\cos 50°)i \cong -55.05i + 65.60j$$

$$|T_2| = (|T_2|\sin 32°)j + (|T_2|\cos 32°)i \cong 55.05i + 34.40j$$