Theorem 1.1.2

Let, $F = \langle a, b, c \rangle$

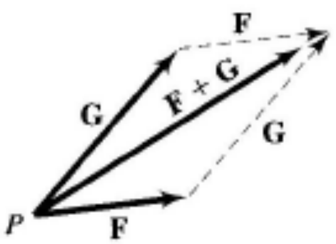
$\|\alpha F\| = \|\alpha \langle a, b, c \rangle\|$
$= \|\langle \alpha a, \alpha b, \alpha c \rangle\|$
$= \sqrt{(\alpha a)^2 + (\alpha b)^2 + (\alpha c)^2} = \sqrt{\alpha^2 a^2 + \alpha^2 b^2 + \alpha^2 c^2}$
$= \sqrt{\alpha^2 (a^2 + b^2 + c^2)}$
$= |\alpha| \sqrt{a^2 + b^2 + c}$
$= |\alpha| \, \|F\|$

let F be a vector and let α be a scalar, then

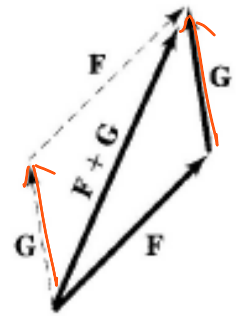
실수 α와 벡터 F 곱의 크기

1. $\|\alpha F\| = |\alpha| \|F\|$ 벡터의 크기 X 실수 α의 절댓값
2. $\|F\| = 0$ *if and only if* $F = \langle 0,0,0 \rangle$

■ **Parallelogram law for vector addition:**



F+G
그대로 써도



Definition 1.1.3

F and G are parallel if and only if each is a nonzero scalar multiple of the other

let $F \neq \langle 0,0,0 \rangle, G \neq \langle 0,0,0 \rangle$, *and* $\alpha \neq 0$, *then* 벡터도 0벡터 아니고, 실수도 0이 아닐 때

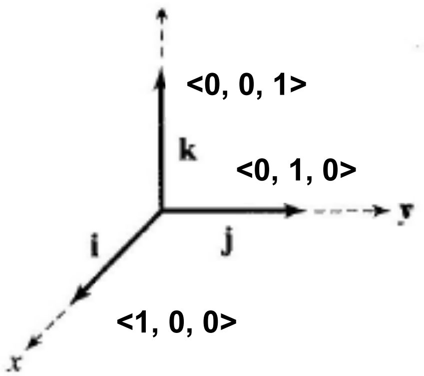
$F = \alpha G$ *if and only if* $\underbrace{F \text{ and } G}_{\text{크기는 다를 수 있지만}}$ *are parallel*

평행

★ Midterm Q.1.2 Two nonzero vectors F and G are parallel with a nonzero scalar a, if $\boxed{F = aG}$

— 표준 형태 —

Standard form of a vector F:



- **i** = <1, 0, 0>
- **j** = <0, 1, 0>
- **k** = <0, 0, 1>

벡터

벡터

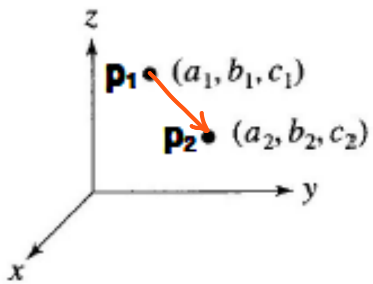
F의 standard form

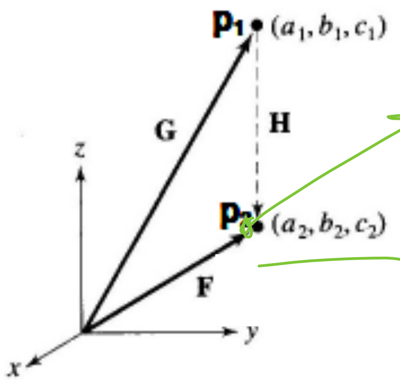
"벡터"

- $F = \langle a, b, c \rangle = a\langle 1,0,0 \rangle + b\langle 0,1,0 \rangle + c\langle 0,0,1 \rangle = a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$

$= \langle a, b, c \rangle$

Vector extending (a_1, b_1, c_1) to (a_2, b_2, c_2):





$G = \langle a_1, b_1, c_1 \rangle$

$F = \langle a_2, b, c_2 \rangle$

- $G + H = F$
  $\therefore H = F - G = \langle a_2 - a_1, b_2 - b_1, c_2 - c_1 \rangle$

$G + H = F$

$H = F - G$

$= \langle a_2, b_2, c_2 \rangle - \langle a_1, b_1, c_1 \rangle$

$= \langle a_2 - a_1, b_2 - b_1, c_2 - c_1 \rangle$

Algebra → 알 수 없는

★ sample midterm Q.2

Example 1.1.1

Find the equation of the straight line L through the points (1, -2, 4) and (6, 2, -3).

Let (x, y, z) be any point on L.

① $\langle x-1, y+2, z-4 \rangle$ — Sample midterm Q.2.1

② $\langle 5, 4, -7 \rangle$ — Sample midterm Q.2.2

For some scalar t,

$$\langle x-1, y+2, z-4 \rangle = t\langle 5, 4, -7 \rangle = \langle 5t, 4t, -7t \rangle$$

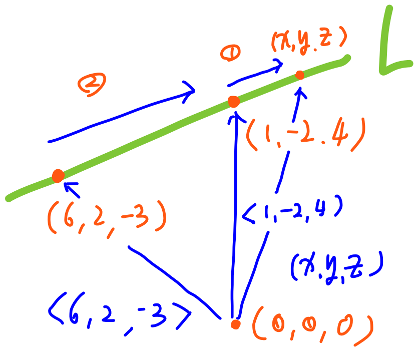
$$\begin{cases} x-1 = 5t \\ y+2 = 4t \\ z-4 = -7t \end{cases}$$

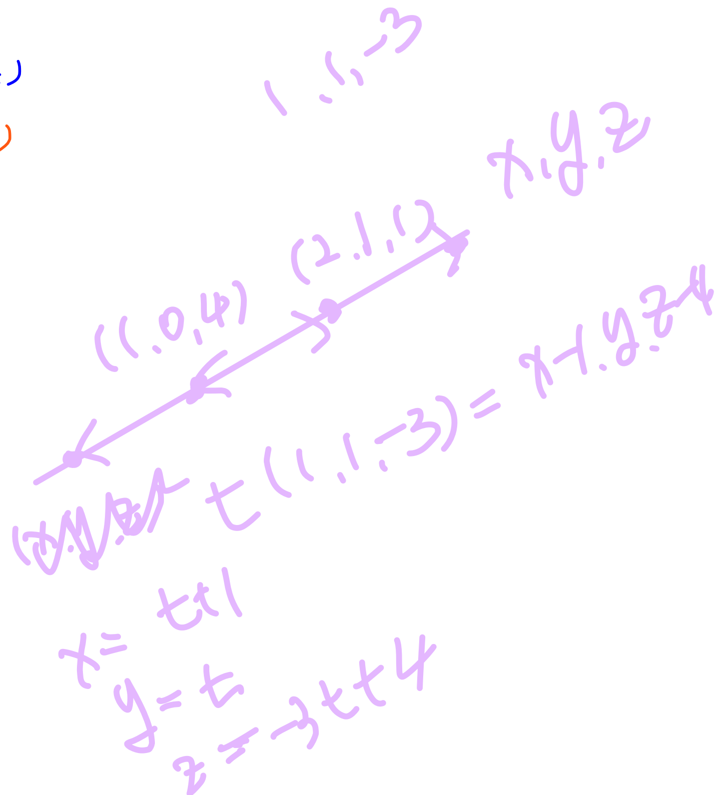
sample midterm Q.2.3

$$\boxed{\begin{cases} x = 5t+1 \\ y = 4t-2 \\ z = -7t+4 \end{cases}}$$

$-\infty < t < \infty$

(t는 모든 실수)





Example 1.1.1

Find the equation of the straight line L through the points (1, -2, 4) and (6, 2, -3).