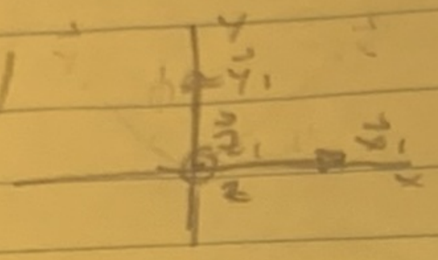
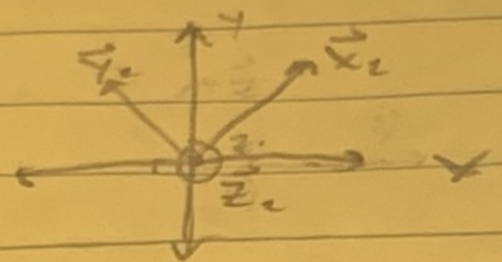
2. a) i/



ii/



iii/ magnitude = $\sqrt{x^2+y^2+z^2}$ → use unit vector (x=1, y=1, z=1)

$\sqrt{\vec{x}_1 + \vec{y}_1 + \vec{z}_1} = \sqrt{1^2+1^2+1^2} = \sqrt{3}$ $\quad \sqrt{3} = \sqrt{3}$ ✓

$\sqrt{\vec{x}_2 + \vec{y}_2 + \vec{z}_2} = \sqrt{1^2+1^2+1^2} = \sqrt{3}$

It has same magnitude

3. a/ For a closed surface, $\oint (\nabla \times \vec{v}) \cdot d\vec{a} = 0$, which means it's a point, hence the coordinates are (0,0,0) since it's centered at the origin.

4. a) i) $\int_{-\infty}^{\infty} (f(x) * g(x))\, d(x)\, dx$ $\quad$ if $f(x) = \cos(x) / g(x) = \sin(x)$

$\int d(x)\, dx = 0$

$= \frac{\cos(x) - \sin(x)}{\cos(x) + \sin(x)}$

$= \frac{\cos(0) - \sin(0)}{\cos(0) + \sin(0)} = \frac{1-0}{1+0} = \frac{1}{1} =$ **1**

ii) if $f(x) = \cosh(x) / g(x) = \sinh(x)$

$= \frac{\cosh(x) - \sinh(x)}{\cosh(x) + \sinh(x)}$ $\quad \cosh(0) - \sinh(0) \quad 1-0$ $\quad 1+0$

iii) if $f(x) = a + ax + ax^2 + \ldots$ and $g(x) = b + bx + bx^2 + \ldots$

$= \frac{(a+ax+ax^2,\ldots) - (b+bx+bx^2+\ldots)}{(a+ax+ax^2+\ldots) + (b+bx+\ldots)}$ $\quad \boxed{a-b}$