



\tilde{x}

$$(ax+by)(ax+by) = x^2 + y^2$$

$$= x^2 + y^2 = \begin{bmatrix} x & y \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix}$$

$$\sqrt{(x^2+y^2)} \mathbf{I} = \begin{bmatrix} x & y \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix}$$

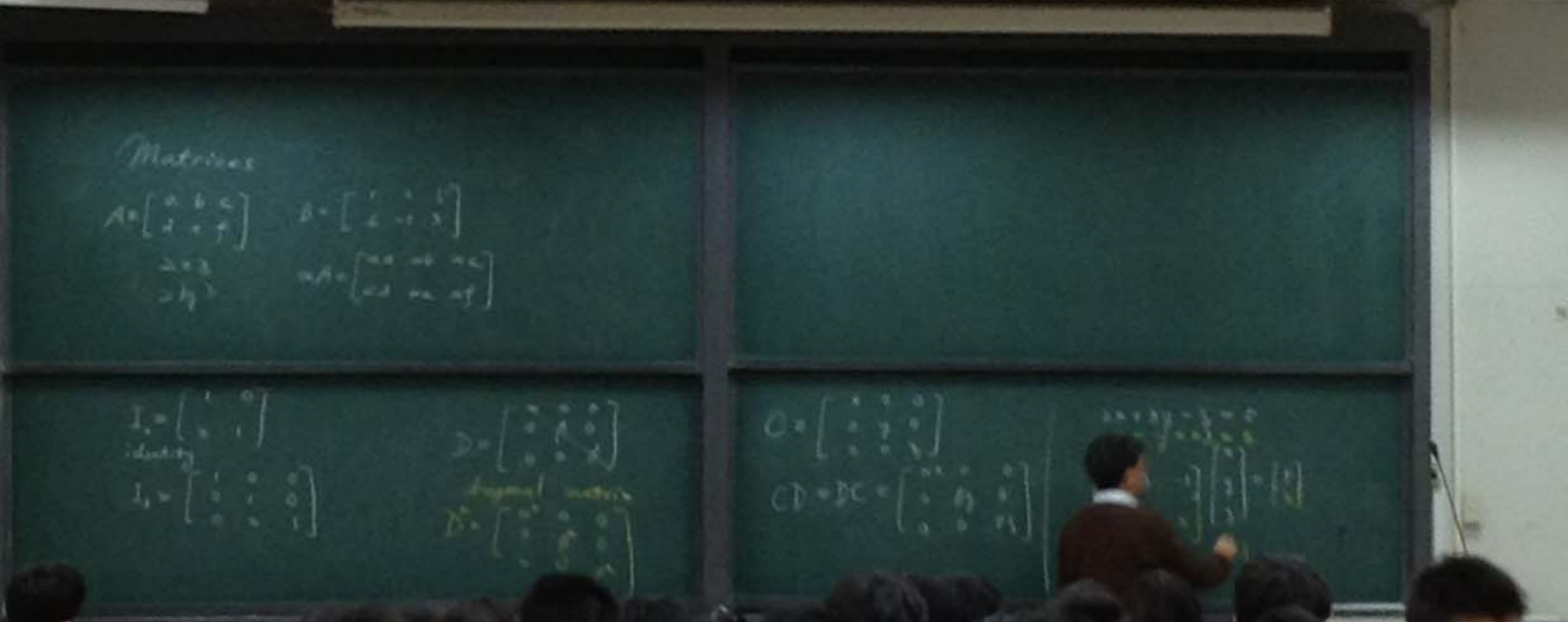
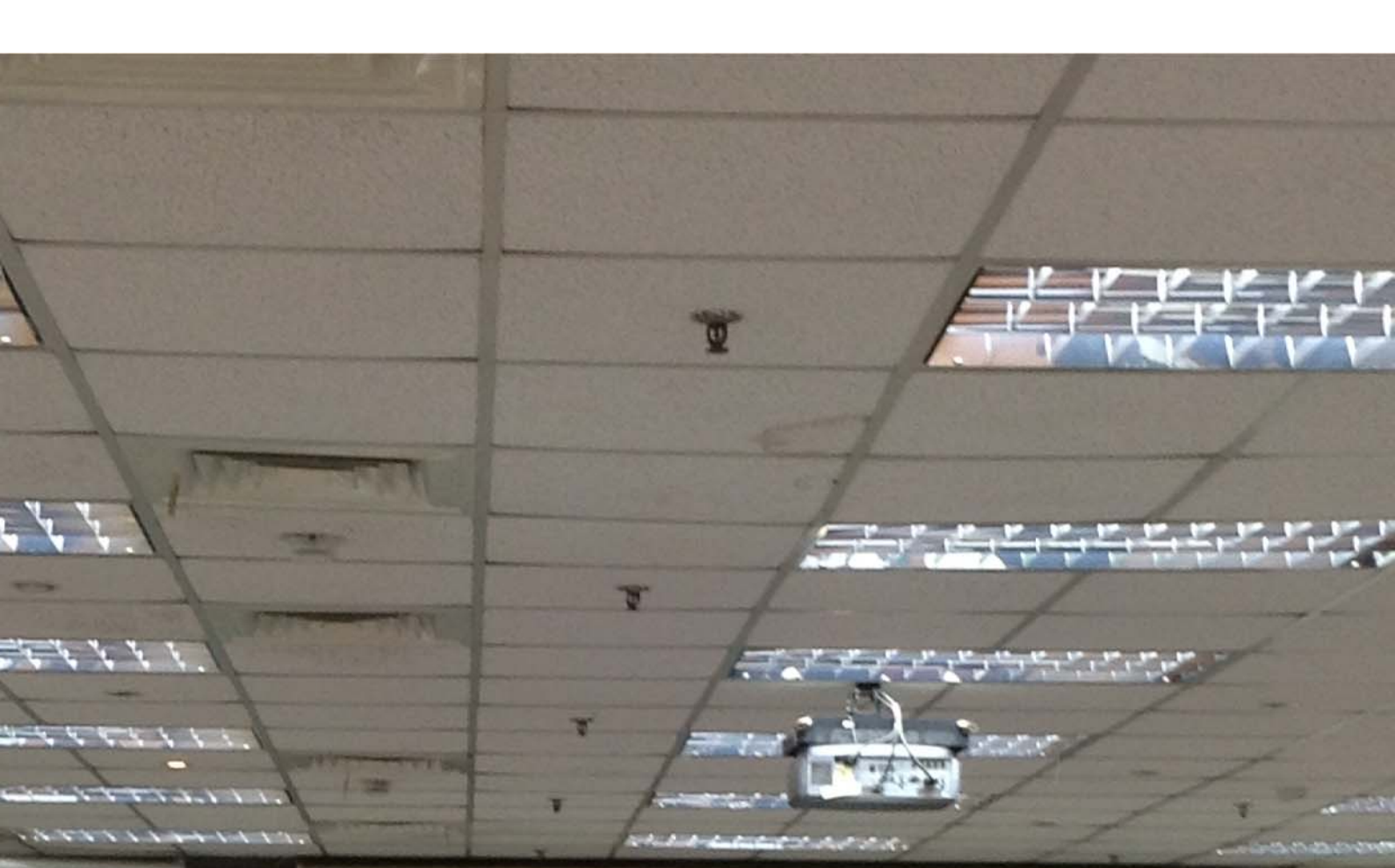
Pauli matrices

$$\sigma_1 = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} \quad \mathbf{I} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\sigma_2 = \begin{bmatrix} 0 & -i \\ i & 0 \end{bmatrix}$$

$$\sigma_3 = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$

$$(a+b)^2 = a^2 + 2ab + b^2$$



Left chalkboard:

$$B = \begin{bmatrix} 1 & 1 & 5 \\ 2 & 1 & 3 \end{bmatrix}$$
$$A = \begin{bmatrix} a_1 & a_2 & a_3 \\ a_4 & a_5 & a_6 \end{bmatrix}$$
$$B = \begin{bmatrix} 1 & 1 \\ -1 & -1 \end{bmatrix} \quad D = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

diagonal matrix

$$O = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

Right chalkboard:

$$C = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$
$$2x + 3y - z = 0$$
$$x - y + 2z = 5$$

3D coordinate system with axes x, y, z. A vector is drawn from the origin to a point in the 3D space.

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$
$$x = \cos \theta \cos \phi - \sin \theta \sin \phi$$
$$y = \cos \theta \sin \phi + \sin \theta \cos \phi$$
$$z = \sin \theta$$



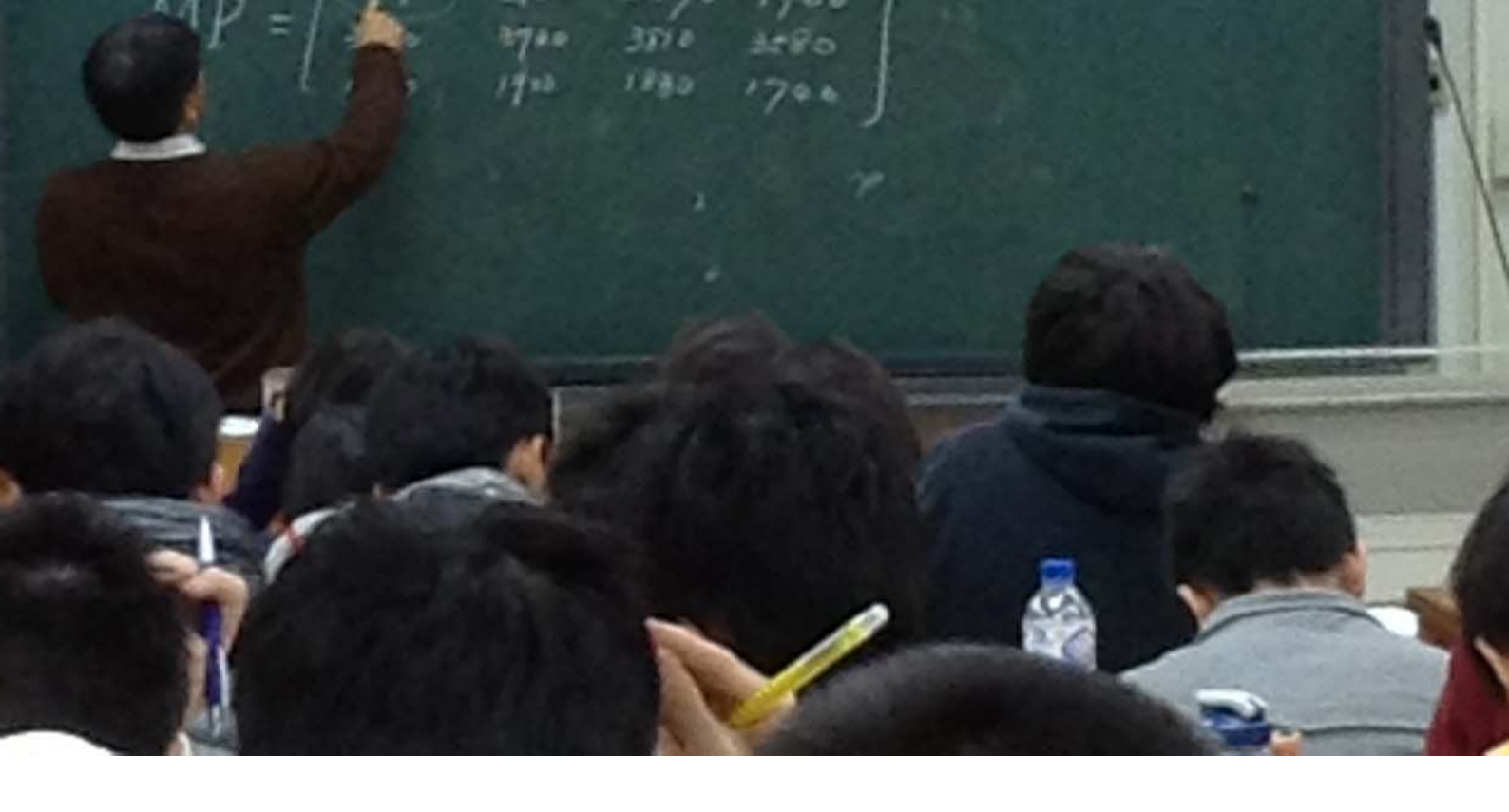

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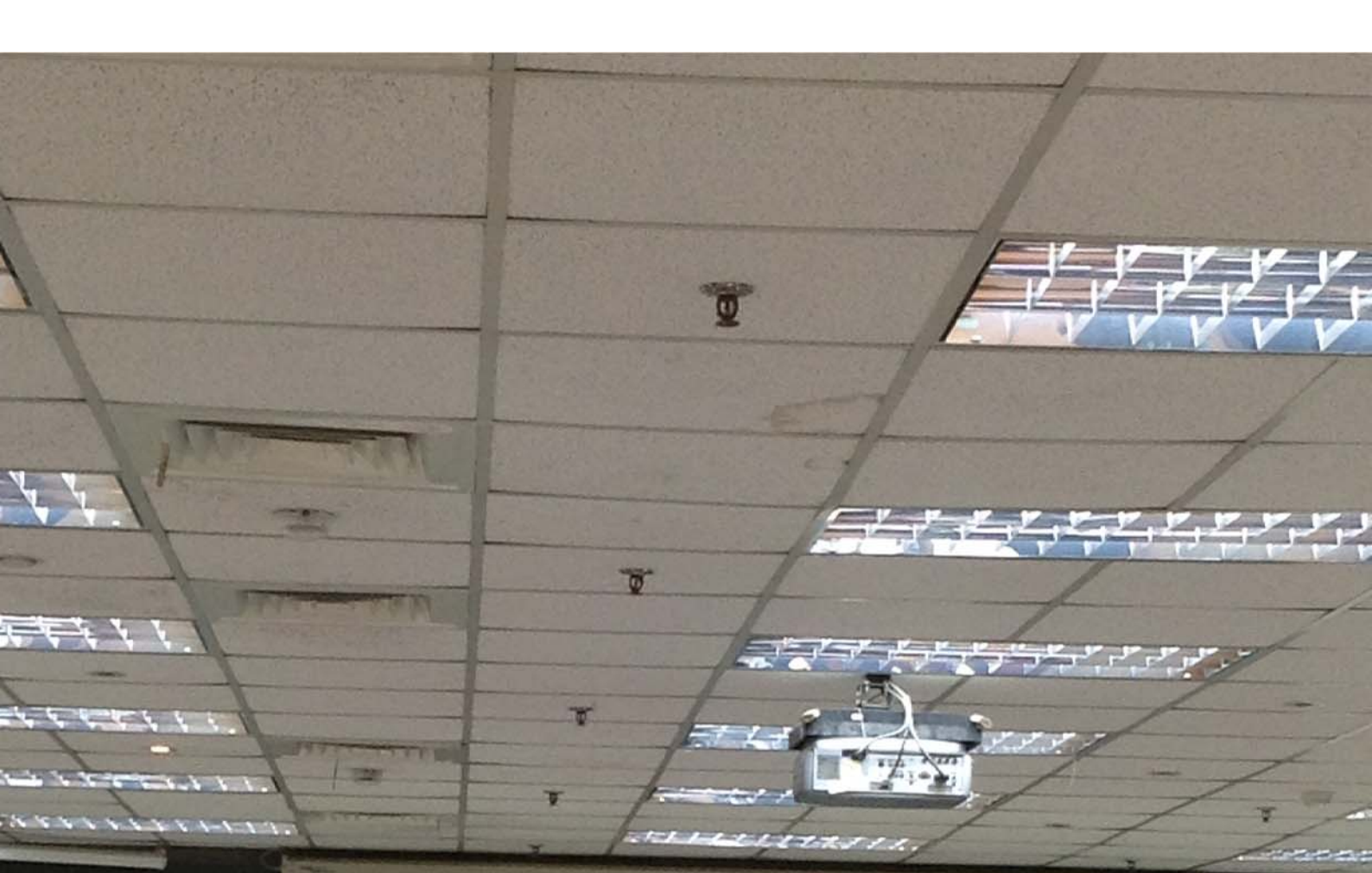
Product	A	B	C
raw material	0.10	0.30	0.15
labor	0.20	0.40	0.25
overhead	0.10	0.20	0.15

Product	Q1	Q2	Q3	Q4
A	6000	6500	6000	6000
B	2000	2600	2200	2200
C	5000	6200	6000	6000

MP =

1170	2160	2070	1960
3000	3700	3510	3580
1700	1800	1700	1700





$$A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 1 \\ -1 & -1 \end{bmatrix} \quad D = \begin{bmatrix} \lambda & 0 & 0 \\ 0 & \lambda & 0 \\ 0 & 0 & \lambda \end{bmatrix}$$

$$AB = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} \rightarrow O = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} \text{ diagonal matrix}$$

Matrices

$$A = \begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix} \quad B = \begin{bmatrix} 1 & 1 & 1 \\ 2 & -1 & 3 \end{bmatrix}$$

$$\alpha A = \begin{bmatrix} \alpha a & \alpha b & \alpha c \\ \alpha d & \alpha e & \alpha f \end{bmatrix}$$

$$(\alpha I)^2 = \alpha^2 I$$

$$(\alpha I)^3 = \alpha^3 I$$

$$\alpha I = I$$

$$\begin{bmatrix} \alpha & 0 \\ 0 & \alpha \end{bmatrix} \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} = I$$

$$\sqrt{x} = |x|$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$MP = \begin{bmatrix} 177 & 266 & 207 & 1760 \\ 220 & 970 & 311 & 3080 \\ 1670 & 170 & 1280 & 1700 \end{bmatrix}$$

$$\sqrt{x^2 + y^2} \rightarrow \sqrt{(x+y)^2} = \sqrt{x^2 + 2xy + y^2}$$

$$\frac{d}{dx} \sqrt{x^2 + y^2} = \frac{2x}{2\sqrt{x^2 + y^2}} = \frac{x}{\sqrt{x^2 + y^2}}$$

$$\frac{d}{dx} \sqrt{(x+y)^2} = \frac{2(x+y)}{2\sqrt{(x+y)^2}} = \frac{x+y}{|x+y|}$$

$$\frac{x}{\sqrt{x^2 + y^2}} = \frac{x+y}{|x+y|}$$

$$\frac{d}{dx} \sqrt{(x+y)^2} = \frac{d}{dx} (x+y) = 1$$

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$$= \begin{bmatrix} \alpha & 0 & 0 \\ 0 & \beta & 0 \\ 0 & 0 & \gamma \end{bmatrix}$$

diagonal matrix

$$(\alpha I)^n = \alpha^n I$$

$$(\alpha I)^m = \alpha^m I$$

$$I I = I$$

$$\begin{bmatrix} \alpha & 0 \\ 0 & \alpha \end{bmatrix} \begin{bmatrix} \alpha & 0 \\ 0 & \alpha \end{bmatrix} = I$$

$$\sqrt{x^2} = |x|$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$MP = \begin{bmatrix} 1170 & 2160 & 2070 & 1960 \\ 2160 & 1700 & 3070 & 3090 \\ 1670 & 170 & 1820 & 1740 \end{bmatrix}$$

$$\sqrt{x^2 + y^2} \rightarrow \sqrt{(x+y)^2} = \sqrt{x^2 + 2xy + y^2}$$

$$\alpha x + \beta y$$

$$(\alpha + \beta)^2 = \alpha^2 + 2\alpha\beta + \beta^2$$

$$(\alpha + \beta y)(\alpha + \beta y) = \alpha^2 + 2\alpha\beta y + \beta^2 y^2$$

$$\sqrt{(x+y)^2} I = \alpha x + \beta y$$

$$= \begin{bmatrix} \alpha & \beta \\ \beta & \alpha \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} \alpha x + \beta y \\ \beta x + \alpha y \end{bmatrix}$$

$$A = \begin{pmatrix} \gamma & -\gamma\beta & 0 \\ -\gamma\beta & \gamma & 0 \\ 0 & 0 & \gamma \end{pmatrix}$$

$$E = \frac{mc^2}{\sqrt{1-\beta^2}}$$

$$E = \frac{mc^2}{\sqrt{1-\beta^2}} = \gamma mc^2$$

$$E = \sqrt{c^2 p^2 + m^2 c^4} = \gamma mc^2 \quad \left[\begin{matrix} \alpha_1 = \beta \\ \alpha_2 = \beta \\ \alpha_3 = \beta \end{matrix} \right]$$

$$\vec{a} = (a_1, a_2, a_3)$$

$$a_1 + a_2 + a_3 = 0$$

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$$a_1 + a_2 + a_3 = 0$$

$$a_1 + a_2 + a_3 = 0$$

$$a_1 + a_2 + a_3 = 0$$

$$(a_1)^2 = 1$$

$$(a_2)^2 = 1$$

$$I = I$$

$$\left[\begin{matrix} \alpha_1 & \alpha_2 & \alpha_3 \\ \alpha_2 & \alpha_1 & \alpha_3 \\ \alpha_3 & \alpha_3 & \alpha_1 \end{matrix} \right] = I$$

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Pauli
 $\sigma_x = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$
 $\sigma_y = \begin{bmatrix} 0 & -i \\ i & 0 \end{bmatrix}$
 $\sigma_z = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$