dot product of a & b =

$\begin{bmatrix} 4 \\ 10 \\ 5 \end{bmatrix}$

Cosine ab = $\begin{bmatrix} 4 \\ 10 \\ 5 \end{bmatrix} \div$ [product of magnitude of a & b

= Dot product of a & b = 32

Cosab 32 / 32.19 = 0.99409

= angle btw a & b

= Cosine of 0.99409

= 12.°

dot product of a . b = 32

multiply a and b

$\bar{a} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \quad b = \begin{bmatrix} 4 \\ 5 \\ 0 \end{bmatrix} = \begin{bmatrix} 4 \\ 10 \\ 5 \end{bmatrix}$

Calculate the dot product of a. b using the angle between a and b.

find magnitude of both Vectors.

$a = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} = \sqrt{(1)^2 + (2)^2 + (3)^2}$

$= \sqrt{1 + 4 + 9} = \sqrt{14} = 3.7$

$b = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} = \sqrt{(4)^2 + (5)^2 + (6)^2}$

$= 16 + 25 + 36 = \sqrt{77} = 8.7$

The angle btw a & b

Cos a b / ||a|| ||b||

= Cos - ab = $\frac{32}{32.19}$

= Cos = $\frac{32}{32.19}$

= 12.9°

The Scalar projection of b onto a

find the Unit Vector of a

$= \frac{1}{\sqrt{14}} \ \frac{2}{\sqrt{14}} \ \frac{3}{\sqrt{14}}$

Find the Inverse of Matrix A and B

$$A\begin{bmatrix}1 & 2 & 3\\ 4 & -2 & 3\\ 0 & 5 & -1\end{bmatrix} \qquad \left(\begin{array}{ccc|ccc}1 & 2 & 3 & 1 & 0 & 0\\ 4 & -2 & 3 & 0 & 1 & 0\\ 0 & 5 & -1 & 0 & 0 & 1\end{array}\right)$$

$$B\begin{bmatrix}1 & 2 & 1\\ 2 & -1 & -4\\ 3 & -2 & 1\end{bmatrix}$$

Pivot element

$$\left(\begin{array}{ccc|ccc}1 & 2 & 3 & 1 & 0 & 0\\ 0 & -10 & -9 & -4 & 1 & 0\\ 0 & 5 & -1 & 0 & 0 & 1\end{array}\right)$$

Invers of A

$$=\begin{bmatrix}-\frac{13}{55} & \frac{17}{55} & \frac{12}{55}\\ \frac{4}{55} & \frac{-1}{55} & \frac{9}{55}\\ \frac{4}{11} & \frac{-1}{11} & -\frac{2}{11}\end{bmatrix}$$

(b)

$$\begin{pmatrix}1 & 2 & 1\\ 2 & -1 & -4\\ 3 & -2 & 1\end{pmatrix}^{(-1)} = \left(\begin{array}{ccc|ccc}1 & 2 & 1 & 1 & 0 & 0\\ 2 & -1 & -4 & 0 & 1 & 0\\ 3 & -2 & 1 & 0 & 0 & 1\end{array}\right)$$

$$\left(\begin{array}{ccc|ccc}1 & 2 & 1 & 1 & 0 & 0\\ 0 & -5 & -6 & -2 & 1 & 0\\ 0 & -8 & -7 & -3 & 0 & 1\end{array}\right) \quad \left(\begin{array}{ccc|ccc}-5 & 0 & 7 & -1 & -2 & 0\\ 0 & -5 & -6 & -2 & 1 & 0\\ 0 & 0 & 38 & -1 & 8 & -5\end{array}\right)$$

Pivot element

$$\left(\begin{array}{ccc|ccc}-38 & 0 & 0 & -9 & -4 & -7\\ 0 & -38 & 0 & -14 & -2 & 6\\ 0 & 0 & -38 & -1 & 8 & -5\end{array}\right) \quad P_3 = a_{3,3} = -38$$

$$\begin{pmatrix}1 & 2 & 1\\ 2 & -1 & -4\\ 3 & -2 & -1\end{pmatrix}^{(-1)} = \frac{1}{-38}\cdot\begin{pmatrix}-9 & -4 & -7\\ -14 & -2 & 6\\ -1 & 8 & -5\end{pmatrix}$$

Pivot element

$P_2 = a_{22} = -10$

$$\frac{\begin{vmatrix}a_{22} & a_{2j}\\ a_{12} & a_{1j}\end{vmatrix}}{P_1} \rightarrow a_{1j}$$

$$\left(\begin{array}{ccc|ccc}-10 & 0 & -12 & -2 & -2 & 0\\ 0 & -10 & -9 & -4 & 1 & 0\\ 0 & 0 & 55 & 20 & -5 & -10\end{array}\right)$$

Pivot element

$P_3 = a_{33} = 55$

$$\begin{vmatrix}a_{33} & a_{3j}\\ a_{13} & a_{1j}\end{vmatrix} \rightarrow a_{1j}$$

$$\left(\begin{array}{ccc|ccc}55 & 0 & 0 & -13 & 17 & 12\\ 0 & 55 & 0 & 4 & -1 & 9\\ 0 & 0 & 55 & 20 & -5 & -10\end{array}\right)$$

$$\begin{pmatrix}1 & 2 & 3\\ 4 & -2 & 3\\ 0 & 5 & -1\end{pmatrix}^{-(1)} = \frac{1}{55}\begin{pmatrix}-13 & 17 & 12\\ 4 & -1 & 9\\ 20 & -5 & -10\end{pmatrix}$$

$$=\begin{pmatrix}\frac{9}{38} & \frac{2}{19} & \frac{7}{38}\\ \frac{7}{19} & \frac{1}{19} & -\frac{3}{19}\\ \frac{1}{38} & -\frac{4}{19} & \frac{5}{38}\end{pmatrix}$$

find $a^T b$ of

T = ~~t~~ transpose of matrix

Transpose of a

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \times \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$$

$= a^T \times b$

$$\begin{bmatrix} 4 & 8 & 12 \\ 5 & 10 & 15 \\ 6 & 12 & 18 \end{bmatrix}$$

find $a b^T$

find the transpose of B $\begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$

$b^T = 4, 5, 6$

$a \times b^T =$

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \times \begin{bmatrix} 4 & 5 & 6 \end{bmatrix}$$

$$= \begin{bmatrix} 4 & 8 & 12 \\ 5 & 10 & 15 \\ 6 & 12 & 18 \end{bmatrix}$$

$2A - B$

multiply 2 by A

$$= A = \begin{bmatrix} 1, & 2, & 3 \\ 4, & -2, & 3 \\ 0 & 5 & -1 \end{bmatrix} \times 2$$

$$2A = \begin{bmatrix} 2 & 4 & 6 \\ 8 & -4 & 6 \\ 0 & 10 & -2 \end{bmatrix}$$

$2A - B =$

$$\begin{bmatrix} 2 & 4 & 6 \\ 8 & -4 & 6 \\ 0 & 10 & -2 \end{bmatrix} - \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & -4 \\ 3 & -2 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 2 & 5 \\ 6 & -5 & 10 \\ -3 & 12 & -3 \end{bmatrix}$$

AB and BA

$AB = A \times B$

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & -2 & 3 \\ 0 & 5 & -1 \end{bmatrix} \quad B \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & -4 \\ 3 & -2 & 1 \end{bmatrix}$$

$$AB = \begin{bmatrix} 1 & 4 & 3 \\ 8 & -2 & -12 \\ 0 & -10 & -1 \end{bmatrix}$$

$$BA = \begin{bmatrix} 1 & 4 & 3 \\ 8 & -2 & -12 \\ 0 & -10 & -1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & -2 & 3 \\ 0 & 5 & -1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 3 \\ 4 & -2 & 3 \\ 0 & 5 & -1 \end{bmatrix}$$

$1 \times 1 + 2 \times 4 + 3 \times 0 = 1 + 8 + 3 = 11$

$4 \times 1 + -2 \times 4 + 3 \times 0 = 4 + 8 + 3 = -1$

$0 \times 1 + 5 \times 4 + -1 \times 0 = 0 + 20 - 1 = 19$

Second Column

$1 \times 2 + 2 \times -2 + 3 \times 5 = 2 + -4 + 15 = 13$

$4 \times 2 + -2 \times -2 + 3 \times 5 = 8 + 4 + 15 = 27$

$0 \times 2 + 5 \times -2 + -1 \times 5 = 0 + -10 + -5 = -20$

3 colun

$0 \times 3 + 5 \times 3 + -1 \times -1$

$4 \times 3 + -2 \times 3 + 3 \times -1$

find $a^T b$ of

T = ~~t~~ranspose of matrix

Transpose of a

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \times \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$$

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$b^T = 4\ 5, 6$

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$$2A - B =$$

$$\begin{bmatrix} 2 & 4 & 6 \\ 8 & -4 & 6 \\ 0 & 10 & -2 \end{bmatrix} - \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & -4 \\ 3 & -2 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 2 & 5 \\ 6 & -5 & 10 \\ -3 & 12 & -3 \end{bmatrix}$$

AB and BA

$AB = A \times B$

$$\overset{A}{=} \begin{bmatrix} 1 & 2 & 3 \\ 4 & -2 & 3 \\ 0 & 5 & -1 \end{bmatrix} \quad B \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & -4 \\ 3 & -2 & 1 \end{bmatrix}$$

$$AB = \begin{bmatrix} 1 & 4 & 3 \\ 8 & -2 & -12 \\ 0 & -10 & -1 \end{bmatrix}$$

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$= \sqrt{1 + 4 + 9} = \sqrt{14} = 3.7$

$b = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} = \sqrt{(4)^2 + (5)^2 + (6)^2}$

$= 16 + 25 + 36 = \sqrt{77} = \underline{8.7}$

The angle btw a & b

Cos a.b / ||a|| ||b||

$= \cos \cdot ab = \frac{32}{32.19}$

$= \cos = \frac{32}{32.19}$

$= 12.9°$

The Scalar projection of b onto a

find the Unit Vector of a

$= \frac{1}{\sqrt{14}} \frac{2}{\sqrt{14}} \frac{3}{\sqrt{14}}$

find the Inverse of Matrix A and B

$$A\begin{bmatrix}1&2&3\\4&-2&3\\0&5&-1\end{bmatrix} \quad \left(\begin{array}{ccc|ccc}1&2&3&1&0&0\\4&-2&3&0&1&0\\0&5&-1&0&0&1\end{array}\right)$$

$$B\begin{bmatrix}1&2&1\\2&-1&-4\\3&-2&1\end{bmatrix}$$

Pivot element

$$\left(\begin{array}{ccc|ccc}1&2&3&1&0&0\\0&-10&-9&-4&1&0\\0&5&-1&0&0&1\end{array}\right)$$

Inverse of a

$$=\begin{bmatrix}-\frac{13}{55}&\frac{17}{55}&\frac{12}{55}\\ \frac{4}{55}&\frac{-1}{55}&\frac{9}{55}\\ \frac{4}{11}&\frac{-1}{11}&-\frac{2}{11}\end{bmatrix}$$

(b)

$$\begin{pmatrix}1&2&1\\2&-1&-4\\3&-2&1\end{pmatrix}^{(-1)} = \left(\begin{array}{ccc|ccc}1&2&1&1&0&0\\2&-1&-4&0&1&0\\3&-2&1&0&0&1\end{array}\right)$$

$$\left(\begin{array}{ccc|ccc}1&2&1&1&0&0\\0&-5&-6&-2&1&0\\0&-8&-2&-3&0&1\end{array}\right) \quad \left(\begin{array}{ccc|ccc}-5&0&7&-1&-2&0\\0&-5&-6&-2&1&0\\0&0&38&-1&8&-5\end{array}\right)$$

Pivot element

$$\left(\begin{array}{ccc|ccc}-38&0&0&-9&-4&-7\\0&-38&0&-14&-2&6\\0&0&-38&-1&8&-5\end{array}\right) \quad P_3 = a_{3,3} = -38$$

$$\begin{pmatrix}1&2&1\\2&-1&-4\\3&-2&-1\end{pmatrix}^{(-1)} = \frac{1}{-38}\cdot\begin{pmatrix}-9&-4&-7\\-14&-2&6\\-1&8&-5\end{pmatrix}$$

Pivot element

$P_2 = a_{22} = -10$

$$\frac{\begin{vmatrix}a_{22}&a_{2j}\\a_{12}&a_{1j}\end{vmatrix}}{P_1} \to a_{ij}$$

$$\left(\begin{array}{ccc|ccc}-10&0&-12&-2&-2&0\\0&-10&-9&-4&1&0\\0&0&55&20&-5&-10\end{array}\right)$$

Pivot element

$P_3 = a_{33} = 55$

$$\begin{vmatrix}a_{33}&a_{3j}\\a_{13}&a_{1j}\end{vmatrix} \to a_{ij}$$

$$\left(\begin{array}{ccc|ccc}55&0&0&-13&17&12\\0&55&0&4&-1&9\\0&0&55&20&-5&-10\end{array}\right)$$

$$\begin{pmatrix}1&2&3\\4&-2&3\\0&5&-1\end{pmatrix}^{-(1)} = \frac{1}{55}\begin{pmatrix}-13&17&12\\4&-1&9\\20&-5&-10\end{pmatrix}$$

$$=\begin{pmatrix}\frac{9}{38}&\frac{2}{19}&\frac{7}{38}\\ \frac{7}{19}&\frac{1}{19}&-\frac{3}{19}\\ \frac{1}{38}&-\frac{4}{19}&\frac{5}{38}\end{pmatrix}$$

④ The derivative $\frac{d}{dx} f(g(x))$ without using the chain rule for derivatives.

$f(g(x))$

$f(x) = x^2 + 3$

$g(x) = x^2$

$f(g(x))$

$= (x^2)(x^2 + 3)$

$= x^4 + 3x^2$

$= 3x^2 + x^4$

$= x^2(3 + x^2) \frac{d}{dx}(3x^2 + x^4)$

$= \frac{d}{dx} =$

$x^2(3 + x^2)(6x + 4x^3)$

$\frac{df(g(x))}{dx} = \frac{d}{dx} f(x^2)$

$= \frac{d}{dx} x^4 + 3 = 4x^3$

$\frac{d}{dx} f(g(x)) = f'(g(x)) \times g'(x)$

$= 2g(x) \times 2x = 2x^2 \times 2x$

$= 4x^3$

(4) $a = \begin{bmatrix}1\\2\\3\end{bmatrix}$ $b = \begin{bmatrix}4\\5\\6\end{bmatrix}$ $C = \begin{bmatrix}-1\\1\\3\end{bmatrix}$

(1) $2a - b$

$2\begin{bmatrix}1\\2\\3\end{bmatrix} = \begin{bmatrix}2\\4\\6\end{bmatrix} - \begin{bmatrix}4\\5\\6\end{bmatrix}$

$= \begin{bmatrix}-2\\-1\\0\end{bmatrix}$

(2) $\hat{a}$ a unit Vector In the direction of a.

$a = \begin{bmatrix}1\\2\\3\end{bmatrix}$ $\|a\| \sqrt{1^2+2^2+3^2} = \sqrt{14}$

$\frac{1}{\sqrt{14}}\begin{bmatrix}1\\2\\3\end{bmatrix} = \begin{bmatrix}\frac{1}{\sqrt{14}}\\ \frac{2}{\sqrt{14}}\\ \frac{3}{\sqrt{14}}\end{bmatrix}$

magnitude of $\|a\|$

$\begin{bmatrix}1\\2\\3\end{bmatrix} = \sqrt{(1)^2+(2)^2+(3)^2}$

$\sqrt{2+4+9}$

$= \sqrt{14} = 3.74.$

Normalize a

$\begin{bmatrix}1\\2\\3\end{bmatrix}$ $\|a\| = \sqrt{14}$

$= \frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$

The Directional Cosine of a

$= a\begin{bmatrix}1\\2\\3\end{bmatrix}$

$\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$

$= \cos\frac{1}{\sqrt{14}}, \cos\frac{2}{\sqrt{14}}\ \cos\sqrt{\frac{3}{\sqrt{14}}}$

Calculate the angle btw a & b

dotmultiply a & b

$= \begin{bmatrix}1\\2\\3\end{bmatrix} \cdot \begin{bmatrix}4\\5\\6\end{bmatrix}$

$= \begin{bmatrix}4\\10\\15\end{bmatrix}$

magnitude of a

$= \sqrt{14}$

magnitud of b

$= \begin{bmatrix}4\\5\\6\end{bmatrix} = \sqrt{(4)^2+(5)^2+(6)^2}$

$= \sqrt{16+25+36}$

$= \sqrt{77}$

$= 8.7$

To calculate the angle btw a & b

$\cos ab / \|a\| \|b\|$

= magnitude product =

$3.74 * 8.7 = 32.19$

(1)

Let $f(x) = x^2 + 3$

The first derivative of $f(x)$ with respect to x: $f'(x)$.

$f_x = x^n$
$= f'_x = nx^{n-1}$

$= 2x +$

$f'(x) = 2x$

$f''(x) = 2 \cdot 1 x^0$

$= f''(x) = 2 \cdot 1 = \underline{\underline{2}}$

(2) find the partial derivatives $\frac{\partial q}{\partial x}$, and $\frac{\partial q}{\partial y}$

$q(x, y) = x^2 + y^2$

$q_x = 2x + y^2 = 2x + 0$

$q_y = \cancel{D}q^2 + 2y = 0 + 2y$

$q_x = 2x + 0 = 2x$

$\frac{dq}{dx} = 2x$

$\frac{dq}{dy} = 2y$

(3) The gradient Vector

$q(x, y) = x^2 + y^2$

The gradient Vector is also called the maximum directional ~~[illegible]~~ derivative & the direction in which they occur

$\nabla q(x, y) = \langle \frac{\partial q}{\partial x}, \frac{dq}{dy} \rangle$

$\frac{dq}{dx} = 2x$

$\frac{dq}{dy} = 2y$

$\nabla q(x, y) = \langle 2x, 2y \rangle$

To find the direction we plug in the Point 1:1

$\nabla q(1, 1) = \langle 2(1), 2(1) \rangle$

$= \langle 2, 2 \rangle$

This is the direction in which the gradient Vector Occur

$\sqrt{2^2 + 2^2}$ $\sqrt{4+4}$ $- \sqrt{8} = 2.82$

This is the maximum Directional derivative and it Occurs in the direction $\langle 2, 2 \rangle$

magnitude of |A| & |C|

first Calculate the dot product of

A & C = $\begin{bmatrix} 6 & 15 & 24 \\ -7 & 1 & 9 \\ 21 & 24 & 27 \end{bmatrix}$

magnitude of A

$\begin{bmatrix} 1, & 2, & 3 \\ 4 & -2 & -3 \\ 0, & 5 & -1 \end{bmatrix}$

$= \begin{bmatrix} 1 & 2, & 3 \\ 4 & \cancel{-2} & \cancel{-3} \\ 0 & 5 & -1 \end{bmatrix}^2$

$= \begin{bmatrix} 1 & 2 & 3 \\ 4 & -2 & 3 \\ 0 & 5 & -1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 3 \\ 4 & -2 & 3 \\ 0 & 5 & -1 \end{bmatrix}$

$1 \times 1 + 2 \times 4 + 3 \times 0$

$\cancel{4 \times 1 + -2 \times 4 + 0 \times}$

$4 \times 1 + -2 \times 4 + 3 \times 0$

$0 \times 1 + 5 \times 4 + -1 \times 0$

$1 \times 2 + 2 \times 2 + 3 \times 5$

$4 \times 2 + -2 \times 2 + 3 \times 5$

$0 \times 2 + -5 \times 2 + -1 \times 5$

$0 \times 2 + 5 \times 2 + -1 \times 5$

magA $= \sqrt{(A)^2}$ & where A = $\begin{bmatrix} 1, & 2, & 3 \\ 4 & -2 & 3 \\ 0 & 5 & -1 \end{bmatrix}$

magA = 8.3

mag C = 10.09

find the transpose of the product of AB

find the Product of A & B

$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & -2 & 3 \\ 0 & 5 & -1 \end{bmatrix} = \begin{bmatrix} 14 & -2 & -5 \\ 9 & 0 & 15 \\ 7 & 7 & -12 \end{bmatrix}$

$B = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & -4 \\ 3 & -2 & 1 \end{bmatrix}$

~~Transpose~~

Transpose

$= \begin{pmatrix} 14 & 9 & 7 \\ -2 & 0 & 7 \\ -5 & 15 & -12 \end{pmatrix}$

find the Inverse of C

$$C \begin{bmatrix} 1, & 2, & 3 \\ 4 & 5 & 6 \\ -1 & 1 & 3 \end{bmatrix}$$

The determinait is 0, the matrix is not Invertible

$$\left(\begin{array}{ccc|ccc} 1 & 2 & 3 & 1 & 0 & 0 \\ 4 & 5 & 6 & 0 & 1 & 0 \\ -1 & 1 & 0 & 0 & 0 & 1 \end{array}\right)$$

Pivot element

$P_1 = a_{1,1} = 1$

$$\begin{vmatrix} a_{1,1} & a_{,j} \\ a_{i,} & a_{i,j} \end{vmatrix} a_{ij} \quad \left(\begin{array}{ccc|ccc} 1 & 2 & 3 & 1 & 0 & 0 \\ 0 & -3 & -6 & -4 & 1 & 0 \\ 0 & 3 & 6 & 1 & 0 & 1 \end{array}\right)$$

Pivot element

$P_2 - a_{2,2} = -3$

$$\begin{vmatrix} a_{22} & a_{2,j} \\ a_{i,2} & a_{ij} \end{vmatrix} \quad \left(\begin{array}{ccc|ccc} -3 & 0 & 3 & 5 & -2 & 0 \\ 0 & -3 & -6 & -4 & 1 & 0 \\ 0 & 0 & 0 & 9 & -3 & -3 \end{array}\right)$$

Product of A d

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & -2 & 3 \\ 0 & 5 & -1 \end{bmatrix} \quad d \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

$$\begin{pmatrix} 1 \cdot 1 + 2 \cdot 2 + 3 \cdot 3 \\ 4 \cdot 1 + (-2) \cdot 2 + 3 \cdot 3 \\ 0 \cdot 1 + 5 \cdot 2 + (-1) \cdot 3 \end{pmatrix} = \underline{14} \begin{pmatrix} 14 \\ 9 \\ 7 \end{pmatrix}$$

Scala projection of the rows of A unto rows d

find the magnitude of A

$$= \begin{pmatrix} 1 & 2 & 3 \\ 4 & -2 & 3 \\ 0 & 5 & -1 \end{pmatrix}^2 = \begin{pmatrix} 9 & 13 & 6 \\ -4 & 37 & 3 \\ 20 & -15 & 16 \end{pmatrix}$$

The eigenvalue & Corresponding eigenvector.