Link zum GitHub:

https://github.com/vanderfriedrich/DataScience_SoSe2022

Einsendeaufgabe 2

2. Linear Algebra Excercise (9. Mai and 5 points)

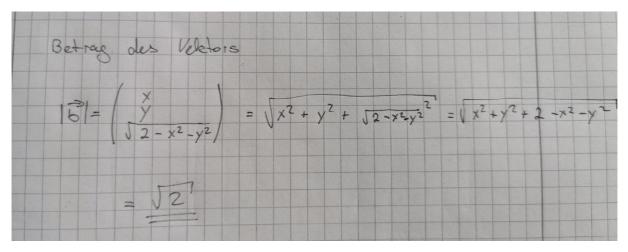
Create the solutions for all exercises given in the LE. Attach exactly one PDF which includes the solution!

2.4.2

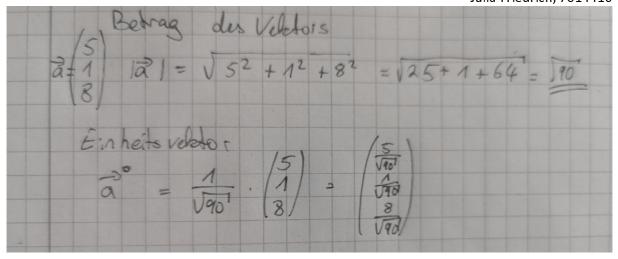
Draw and calculate a 2 or/and 3 dimensional example.

Calculate the norm of b from the equation below.

$$\overrightarrow{b} = egin{pmatrix} x \ y \ \sqrt{2-x^2-y^2} \end{pmatrix}$$



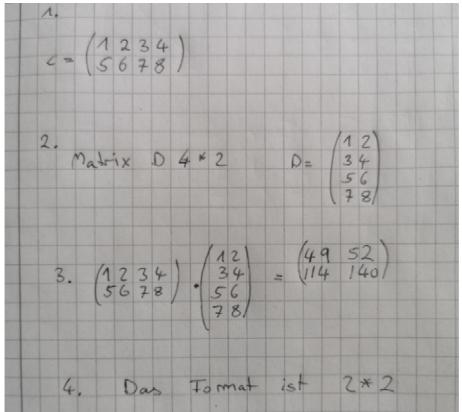
What is the unit vector of the vector with the values 5,1,8?



2.4.3

Now play with the matrix part of ImmersiveMath

- Make up a specific matrix C=(4 x 2)
- What is the format of a new matrix D that can be multiplied with C? (one easy example)
- Multiply these two.
- What is the resulting format of any matrix multiplication?



2.8 Excercises MAT

1. **Multiply** the following two matrices manually:

$$\begin{pmatrix} 4 & 2 & 3 \\ 5 & 1 & 6 \end{pmatrix} * \begin{pmatrix} 3 & 2 \\ -1 & -3 \\ 6 & 8 \end{pmatrix}$$

21	15
50	55

Ergebnis:

$$\begin{pmatrix} 21 & 15 \\ 50 & 55 \end{pmatrix}$$

2. **Determinant** Do a little research:

- What is a **determinant** of a matrix?
- What can it be used for?
- What is the resulting determinant of this matrix (manually):

Eine Determinate ist der Wert einer quadratischen Matrix. Also einer Matrix die gleich viele Zeilen und Spalten hat.

Sie kann zum Lösen von linearen Gleichungen eingesetzt werden, zum Invertieren einer Matrix aber auch zur Flächenberechnung.

Die Berechnung der Determinate einer 2*2 Matrix entspricht:

$$|A| = \det(A) = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = a \cdot d - b \cdot c$$

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

Determinate:

$$(1*3*-4) + (3*5*2) + (4*-2*-3) - (4*3*2) - (3*-2*-4) - (1*5*-3)$$

=-12+30+24-24-15= |-21| = 21