Lab notes 31.01.2020

- matrices: n rows by m columns $n \times m$ matrix
- vectors: bold lower case **b** or $\vec{b}$
- matrices: bold upper case **M**
- matrix elements: matrix name lower case with subscripts m_{11} for matrix **M**, in programming we generally use 0, so it's m_{ij} with $i, j = 0$
- whether or not indices start from 0 or from 1 depends on the programming language or even between libraries
- identity matrices **I** are kinda like 1 in the scalar world, **I** multiplied by any matrix **M** yields **M**
- a vector is basically a row or column of a matrix
- row vector $= 1 \times n$ matrix, column vector $= n \times 1$ matrix
- transposing a matrix = rows become columns – $m_{ij}^T \to m_{ji}$
- scalar multiplication: all components of the matrix multiplied by scalar
- matrix multiplication: $M \times N$ for `ncols(M) == nrows(N)`, resulting matrix will have `nrows(M)` and `ncols(N)`
- matrix multiplications are mostly used for transformations: translation, rotation, magnification
- matrix multiplication is not commutative, except for multiplications with identity matrices
- $\vec{a} \times B$ must conform to the same rules as $A \times B$
- matrices are very useful and generally pretty compact
- we can use $\vec{i}, \vec{j}, \vec{k}$ to get specific columns of a matrix, basically getting all x, y, z values, the generally have length 1 – **basis vectors**
- by modifying $\vec{i}, \vec{j}, \vec{k}$ we technically modify the whole coordinate system
- the rows of the matrix that contains the basis vectors are the basis vectors
- this can be use to scale and rotate objects – **transformations**
- we use Euler angles to specify angles – what are they?