# Introtest computer graphics

To assesses your background knowledge and calibrate what needs review in class answer the first three questions
– in **blue pen** off the top of your head
– in **black pen** using any means of help.
State any (reasonable) assumption you use to answer. A yes or no answer without explanation is worth 0 points.

## 1 Linear Algebra

- Compute the matrix products

$$\begin{bmatrix}1 & 1 & 1 & 1\end{bmatrix}\begin{bmatrix}1\\1\\1\\1\end{bmatrix} = \qquad \begin{bmatrix}1\\1\\1\\1\end{bmatrix}\begin{bmatrix}1 & 1 & 1 & 1\end{bmatrix} =$$

## 2 Normals

- What object is described by the set $S := \{(x, y, z) : x^2 + y^2 - 1 + z^2 = 0\}$?
- What is the normal to $S$ at $(1, 0, 0)$?

# 3 Rotation

Given two matrices $A$ and $B$ that rotate a point $\mathbf{x} \in \mathbb{R}^3$, does it make a difference if we first apply $B$ to $\mathbf{x}$ and then $A$
rather than first $A$ and then $B$?

# 4 Projection

In 3-space, a plane $\mathbf{abc}$ is spanned by three points $\mathbf{a}, \mathbf{b}, \mathbf{c} \in \mathbb{R}^3$. The point $\mathbf{x} \in \mathbb{R}^3$ does not lie on the plane $\mathbf{abc}$.

- Give a procedure (formulas) to find the point $\mathbf{p}$ on $\mathbf{abc}$ with minimal distance to $\mathbf{x}$.

# 5 Programming

Are you familiar with C++?

- Define a pointer `p` to the 10th entry of an integer array `a[20]`.
- Use the pointer to return the value in `a[11]`.

What is CMake?

# 6 List your exposure to computer graphics so far

# 7 What do you expect from attending this course?