Latex Competency Check

Your task is to reproduce this document (with my picture replaced by the picture of your choosing) using your own Latex source code. Note that there will be more than one way to code this, i.e. there is no “right answer” in terms of the code. The right code will be code that produces a document that looks like this piece of paper.

1 Some basic math

Suppose $A$ is a matrix of the form

$$
\begin{pmatrix}
  a_{11} & a_{12} & a_{13} \\
  a_{21} & a_{22} & a_{23} \\
  a_{31} & a_{32} & a_{33}
\end{pmatrix}.
$$

Then if $x$ is a vector of the form

$$
x = \begin{pmatrix}
  x_1 \\
  x_2 \\
  x_3
\end{pmatrix}, \quad \text{i.e. } x \text{ satisfies } x \in \mathbb{R}^3,
$$

and $y$ satisfies

$$
y = Ax,
$$

then it is clear that $y$ too is in $\mathbb{R}^3$. If $B$ and $C$ are two additional $3 \times 3$ matrices and it so happens that $y = Bx$ and $y = Cx$, then we have a system of the form

$$
\begin{align*}
y &= Ax \\
y &= Bx \\
y &= Cx.
\end{align*}
$$

Can we infer that $A = B = C$? Note that equations (1), (2), and (3) form an algebraic system of three equations, but that there are 27 unknowns.

Hints: Here are some commands that I used to produce this document—they might be useful for you, too.

- \qquad (spacing in math mode)
- \notag (label suppression)
- \mathbb (funky font)
- \mbox (allows you to write normal text inside of math mode)
- \includegraphics (needs the package “graphicx”.)