LA1 - Version 2 - Exercise 2

Ondrej Salamon

```
# initial setup
options(scipen = 999)
options(tinytex.verbose = TRUE)
library(matlib)
library(knitr)
library(rmarkdown)
library(quarto)
library(tinytex)
library(pandoc)
knitr::opts_chunk$set(echo=TRUE, message=FALSE, warning=FALSE, fig.width=6, fig.height=6)
```

Compute inverse of A:

```
A <- matrix(c(2,-2, 1,
              1,-1, 1,
             -5, 6,-4), 3, 3, byrow=TRUE)

Aminus <- Inverse(A)
```

Code the result in R:

```
Eqn(
    "\\mathbf{A^-1} = ",
    latexMatrix(Aminus, matrix="bmatrix")
)
```

Show result (in Latex):

$$\mathbf{A^-1} = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ -1 & 2 & 0 \end{bmatrix}$$

Add other matrix B and two vectors u and v:

```
B <- matrix(c( 2, 0, 2,
              -1, 2, 0,
               3, 3, 2), 3, 3, byrow=TRUE)
```

```
u <- c(3, 2, 2)
```

```
v <- c(2, 0, 1)
```

Calculate whole exercise alltogether:

```
Au <- A %*% u

Bv <- B %*% v

AuBvplus = (Au + Bv)

final = Aminus %*% AuBvplus
```

Code exercise in matlib + Latex-compatible:

```
Eqn(
    "\\mathbf{A^-1 * (Au + Bv)} =",
    "\\mathbf{A^-1} *",
     latexMatrix(Au, matrix="bmatrix"),
     Eqn_hspace(mid='+'),
     latexMatrix(Bv, matrix="bmatrix"),
     Eqn_hspace(mid='='),
     latexMatrix(Aminus, matrix="bmatrix"),
     Eqn_hspace(mid='*'),
     latexMatrix(AuBvplus, matrix="bmatrix"),
     Eqn_hspace(mid='='),
     latexMatrix(final, matrix="bmatrix")
)
```

Show exercise solution (R's Latex output)

$$\mathbf{A^{-}1} * (\mathbf{Au} + \mathbf{Bv}) = \mathbf{A^{-}1} * \begin{bmatrix} 4 \\ 3 \\ -11 \end{bmatrix} + \begin{bmatrix} 6 \\ -2 \\ 8 \end{bmatrix} = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ -1 & 2 & 0 \end{bmatrix} * \begin{bmatrix} 10 \\ 1 \\ -3 \end{bmatrix} = \begin{bmatrix} 19 \\ 10 \\ -8 \end{bmatrix}$$