ue01: Rechnen mit Matrizen Teil 2

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

double gibFkZahlEin(char* txt)
{
    char s[80];
    char n;
    double wert;

    do
    {
    printf("%s: ", txt);

    fgets(s, 80, stdin);
    n = sscanf(s, "%lf", &wert);
    } while(n != 1);

    return wert;
}

void gibMatrixEin(char name, double* a11, double* a12, double*
a21, double* a22)
{
    char kleinbuchstabe;
    char i[100];

    kleinbuchstabe = name - 'A' + 'a';

    printf("\nMatrix %c\n", name);

    sprintf(&i, "%c 11", kleinbuchstabe);
    *a11 = gibFkZahlEin(i);
    sprintf(&i, "%c 12", kleinbuchstabe);
    *a12 = gibFkZahlEin(i);
    sprintf(&i, "%c 21", kleinbuchstabe);
    *a21 = gibFkZahlEin(i);
    sprintf(&i, "%c 22", kleinbuchstabe);
    *a22 = gibFkZahlEin(i);



}

void gibMatrixAus(char name, double a11, double a12, double a21,
double a22)
{
    printf("\nMatrix %c\n", name);
```

```
    printf("/ \t %10.3lf \t %10.3lf \t\t\\\n", a11, a12);
    printf("\\\t %10.3lf \t %10.3lf \t\t/\n", a21, a22);

}

void addiereMatrix(double a11, double a12, double a21, double a22,
double b11, double b12, double b21, double b22, double* c11,
double* c12, double* c21, double* c22)
{
    *c11 = a11 + b11;
    *c12 = a12 + b12;
    *c21 = a21 + b21;
    *c22 = a22 + b22;

}

void subtrahiereMatrix(double a11, double a12, double a21, double
a22, double b11, double b12, double b21, double b22, double* c11,
double* c12, double* c21, double* c22)
{
    *c11 = a11 - b11;
    *c12 = a12 - b12;
    *c21 = a21 - b21;
    *c22 = a22 - b22;

}

void multipliziereMatrixMitSkalar(double* a11, double* a12,
double* a21, double* a22, double skalar)
{
 *a11 = *a11 * skalar;
 *a12 = *a12 * skalar;
 *a21 = *a21 * skalar;
 *a22 = *a22 * skalar;
}

void multipliziereMatrizen(double a11, double a12, double a21,
double a22,double b11, double b12, double b21, double b22,double*
c11, double* c12, double* c21, double* c22)
{
   *c11 = a11 * b11 + a12 * b21;
   *c12 = a11 * b12 + a12 * b22;
   *c21 = a21 * b11 + a22 * b21;
   *c22 = a21 * b12 + a22 * b22;

}

void loescheBildschirm()
{
  system("clear");
}

void warteAufEnterTaste()
```

```
{
  char s[4]; printf("\nBitte ENTER Taste drücken!");
  fgets(s,4,stdin);
  fflush(stdin);
}


int main ()
{
    double a11;
    double a12;
    double a21;
    double a22;
    double b11;
    double b12;
    double b21;
    double b22;
    double c11;
    double c12;
    double c21;
    double c22;
    int eingabe;

    printf("Rechnen mit 2x2 Matrizen\n"
           "========================\n");

    printf("\nAddition zweier
Matrizen .................................1\n"
           "Subtraktion zweier
Matrizen ...............................2\n"
           "Multiplikation zweier
Matrizen ............................3\n"

"Programmende ..............................................9\n\
n");

    eingabe = gibFkZahlEin("Ihre Wahl");

    loescheBildschirm();


    switch(eingabe)
    {
    case 1:

    printf("Addition zweier Matrizen\n");

    gibMatrixEin('A', &a11, &a12, &a21, &a22);

    gibMatrixEin('B', &b11, &b12, &b21, &b22);
    addiereMatrix(a11, a12, a21, a22, b11, b12, b21, b22, &c11,
     &c12, &c21, &c22);
    gibMatrixAus('C', c11, c12, c21, c22);
```

```
    warteAufEnterTaste();
    loescheBildschirm();

    main();

    break;

    case 2:

    printf("Subtraktion zweier Matrizen\n");

    gibMatrixEin('A', &a11, &a12, &a21, &a22);

    gibMatrixEin('B', &b11, &b12, &b21, &b22);
    subtrahiereMatrix(a11, a12, a21, a22, b11, b12, b21, b22,
     &c11, &c12, &c21, &c22);
    gibMatrixAus('C', c11, c12, c21, c22);

    warteAufEnterTaste();
    loescheBildschirm();

    main();

    break;

    case 3:

    printf("Multiplikation zweier Matrizen\n");

    gibMatrixEin('A', &a11, &a12, &a21, &a22);

    gibMatrixEin('B', &b11, &b12, &b21, &b22);
    multipliziereMatrizen(a11, a12, a21, a22, b11, b12, b21, b22,
     &c11, &c12, &c21, &c22);
    gibMatrixAus('C', c11, c12, c21, c22);

    warteAufEnterTaste();
    loescheBildschirm();

    main();

    break;

    case 9:

        printf("Programm beendet!");

    break;
    }

    return 0;
}
```

```
Rechnen mit 2x2 Matrizen
========================

Addition zweier Matrizen ..................................1
Subtraktion zweier Matrizen ...............................2
Multiplikation zweier Matrizen ............................3
Programmende .............................................9

Ihre Wahl:
```

```
Addition zweier Matrizen

Matrix A
a 11: 2
a 12: 2
a 21: 2
a 22: 2

Matrix B
b 11: 2
b 12: 2
b 21: 2
b 22: 2

Matrix C
/             4.000             4.000             \
\             4.000             4.000             /

Bitte ENTER Taste drücken!
```

```
Subtraktion zweier Matrizen

Matrix A
a 11: 2
a 12: 2
a 21: 2
a 22: 2

Matrix B
b 11: 2
b 12: 2
b 21: 2
b 22: 2

Matrix C
/             0.000           0.000             \
\             0.000           0.000             /

Bitte ENTER Taste drücken!
```

```
Multiplikation zweier Matrizen

Matrix A
a 11: 2
a 12: 2
a 21: 2
a 22: 2

Matrix B
b 11: 2
b 12: 2
b 21: 2
b 22: 2

Matrix C
/             8.000           8.000             \
\             8.000           8.000             /

Bitte ENTER Taste drücken!
```

```
Programm beendet!
RUN FINISHED; exit value 0; real time: 3m 26s; user: 0ms; system: 10ms
```