Mathematics 1266 (C Programming) Hilary 2019, fifth assignment

February 25, 2019

due by 5pm Monday 11/3/19

This assignment extends the fourth assignment. It takes only keyboard or redirected input.

```
a.out < 2x2
```

The fourth assignment was to extract 'minor matrices' from a given matrix. This assignment is to compute the determinant of an $n \times n$ matrix with a function

```
double det ( int n, double  a[10][10] )
{ }
```

using this formula:

$$\det(n, a) = \begin{cases} a_{0,0} & \text{if } n == 1 \\ \sum_{j=0}^{n-1} (-1)^j a_{0,j} \text{minor}_{0,j}(a) & \text{otherwise} \end{cases}$$

The (i, j)-minor is the determinant of the (i, j)-minor-matrix, so implicitly you need to extract certain minor matrices and *recursively* compute their determinant.

```
prompt% cat 1x1
1 1
245
0
prompt% a.out < 1x1
1x1 determinant = 245.000000

prompt% cat 2x2
2 2
1 2
3 4
0
```

```
prompt% a.out < 2x2
2x2 determinant = -2.000000

prompt%
prompt% cat 3x3
3 3
1 2 3
4 5 6
7 8 8
0

prompt% a.out < 3x3
3x3 determinant = 3.000000

prompt% cat 3x3eile
3 3
1 2 3
4 5 6
7 8 9
0

prompt% a.out < 3x3eile
3x3 determinant = 0.000000

prompt% cat 6x6
6 6
   2  -4  -4   2  -8  -6
  -2   4   3   0   7   4
   3  -7  -8   6 -13 -12
  -3   7   7  -6  10  14
  -2   3   2  -2   2   9
   1   0   1   0  -1  -4
0

prompt% a.out < 6x6
6x6 determinant = -8.000000
```

- Comments are important and helpful, but please try to keep the lines in your program short — under 80 columns wide.
- Make sure your program works, ***on the maths machines,*** or at least that it 'compiles.' It is bad if a program is not working properly, but the ***worst*** thing you can do is to submit a program which does not compile on the maths machines.
- In programming, it is very important to follow a specification *exactly,* and for this reason you will always be expected to follow the specification *exactly.*