Homework

1. Expression for the Gaussian elimination

We have Ax=b with a tridiagonal matrix of dimension NxN. So we can start directly, without reordering the rows. The first row of A will stay the same, so we do an iteration over N-1 other rows:

```
for i := 1 to N-1:
        factor = A(i+1,i)/A(i,i)
        # this is a calculation of the factor, with witch we have to multiplicate the previous row and
        add it to the next row to eliminate the left offdiagonal element
        b(i+1) = b(i+1) – factor * b(i)
        # this is an update of the vector b, so the solution stays the same
        for k := 1 to N:
                A(i+1,k) = A(i+1,k) – factor *A(i,k)
                # this is an update of the row i+1
```

With this algorithm we get an upper right triangular matrix A and an updated vector b. By doing backward substitution, we can get the solution of the linear equation system.

2. Backward substitution

We have Ax=b with an upper right triangular matrix A of dimension NxN. We have to start with:

```
x(N) = b(N)/A(N,N)

for i := 1 to N-1:
        for k := N-(i-1) to N:
                n(N-i) -= A(N-i,k) * x(k)
                # since the offdiagonal elements are not 0, we have to subtract the offdiagonal
                elements times the solution x.
        x(N-i) = b(N-1) / A(N-i,N-i)
```

with that algorithm we get the solution vector x.