Name: _____

Date: _____

Collaborators: _____

(Collaborators submit their individually written assignments together)

Question:	1	2	3	4	5	Total
Points:	5	30	30	15	10	90
Score:						

Instructor/grader comments:

Course logistics

1. (5 points) Select one:

   ☐ I've created a new gitlab account on the UConn GitLab server

   My account name: _____

   ☐ I've deleted old project from my existing gitlab account

Sign and date here: _____

Upload your homework 1 as following:

1. Use gitlab web interface to create a new project called **hw01** (the name must be exactly as shown)
2. Use gitlab web interface to add *README.md* file and edit it to add some meaningful content, e.g. the explanation of your reasoning while writing the code
3. Use gitlab web interface to upload your matlab code to your project
4. Use gitlab web interface to add the access to your project (with the permission of the *reviewer*) to the user `michael.rozman`

Jacobi and Gauss-Seidel iterations

2. Use the code that we develop in class and conduct numerical experiments to determine the properties of the Jacobi method.

   (a) (15 points) Verify whether or not the convergence rate of the method depends on the right hand side of the equation $A\,x = b$. Conduct your calculations for three different vectors b_i:

   1. `b1 = rand(n, 1);`
   2. `b2 = randn(n, 1);`
   3. `b3 = ones(n, 1);`

   where n is the dimension of the matrix A.

   On the same graph plot the convergence parameter vs the iteration number for the three calculations. Clearly describe your conclusions in your project's readme

file. Place the code you wrote for this part of the homework in a single matlab file, e.g. **hw01a.m**

(b) (15 points) Verify whether or not the convergence rate of the method depends on the matrix in the equation $A\,x = b$. Conduct your calculations for three different matrices A_i:

1. `A1 = A + 5*speye(n);`
2. `A2 = A + 9*speye(n);`
3. `A3 = rand(n,n) + 66*eye(n);`

where `A = bucky()` and n is the dimension of the matrix A.

On the same graph plot the convergence parameter vs the iteration number for the three calculations. Clearly describe your conclusions in your project's readme file. Place the code you wrote for this part of the homework in a single matlab file, e.g. **hw01b.m**

3. Use the code that we develop in class and conduct numerical experiments to determine the properties of the Gauss-Seidel method.

(a) (15 points) Reproduce your numerical experiments from Problem 2.a, now for the Gauss-Seidel method. Describe your conclusions in the readme file. Place your code in a single matlab file, e.g. **hw01c.m**.

(b) (15 points) Reproduce your numerical experiments from Problem 2.b, now for the Gauss-Seidel method. Describe your conclusions in the readme file. Place your code in a single matlab file, e.g. **hw01d.m**.

4. Compare the numerical performance of the Jacobi and the Gauss-Seidel methods.

(a) (15 points) On the same graph plot the convergence parameter vs the iteration for both methods, using the same A and b. Clearly describe your conclusions in your project's readme file. Place the code you wrote for this part of the homework in a single matlab file, e.g. **hw01e.m**

Gitlab

5. (10 points) Create a gitlab project called **hw01** (name it exactly as shown). Upload **all** required matlab code and create your readme file. Share the project with the instructor.