2. is convex, , , , so .
3. , so .
4. The result is shown in the table below.

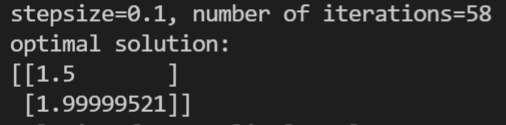
|  |  |
| --- | --- |
| Step Size | Number of Iterations |
| 2.2 | Do not converge |
| 1 | 88 |
| 0.1 | 917 |
| 0.01 | 9206 |

1. The result is shown in the table below.

|  |  |
| --- | --- |
|  | Number of Iterations |
| 1 | 1 |
| 0.1 | 88 |
| 0.01 | 688 |
| 0.001 | 4603 |

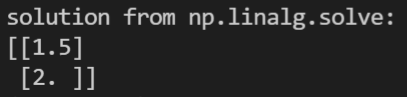
The number of iterations increases as decreases.

1. The output is my implementation is



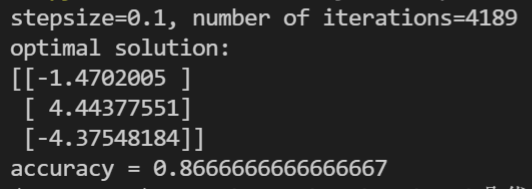
The solution I have found in HW5 is .

The output of np.linalg.solve is



Ignoring the numeric error, they agree with each other.

1. The output of the program is



1. is differentiable and -strongly convex, so

is -smooth, so

Therefore,

which shows that is convex.