Examples

December 10, 2025

[8]:
```
include("notebook_init.jl")
```

This notebook generates the figures in the paper *Complexity of Projected Gradient Methods for Strongly Convex Optimization with H{"o}lder Continuous Gradient Terms* by X. Chen, C. T. Kelley, and L. Wang

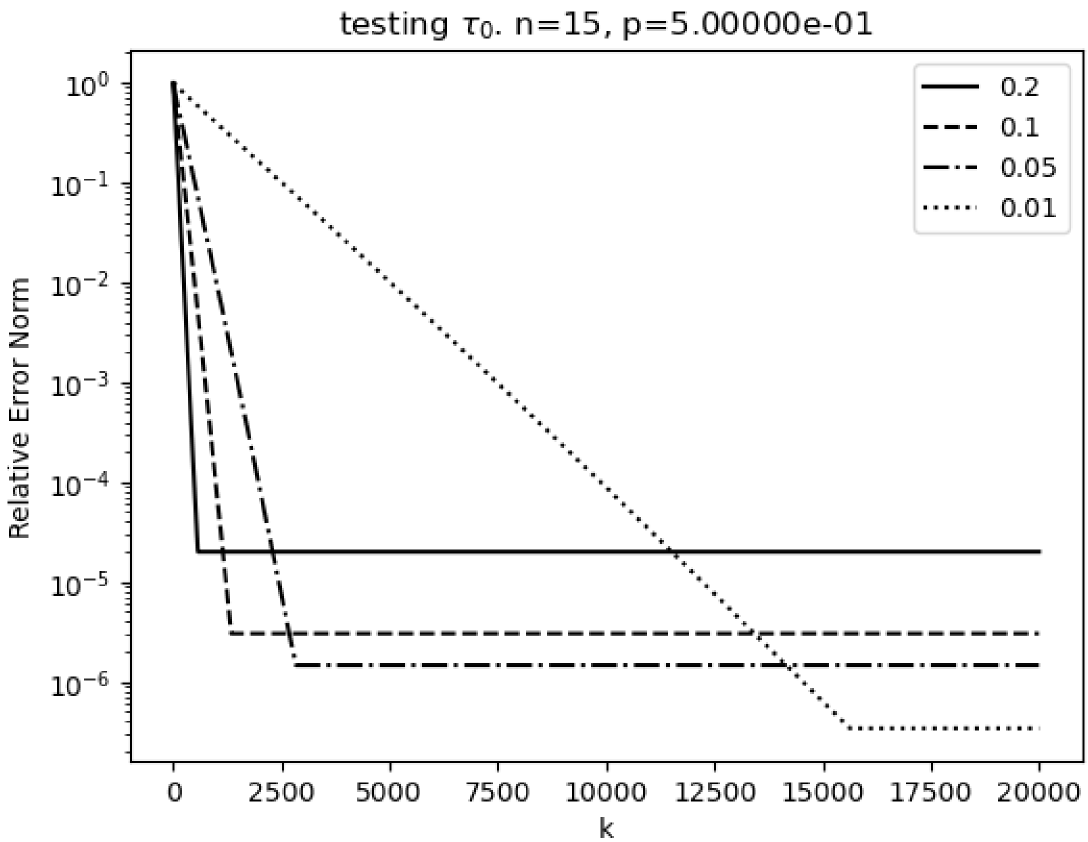
Example 1

Generate Figures 1(a), 1(b), 2(a), and 2(b). Theses figures are for Algorithm 1. Figures 1(a) and 2(a) compare various stepsizes $\tau = \tau_0 h^2$ which are consistent with the CFL condition. Figures 1(b) and 2(b) examine values of the exponent p.

The files for building the figures are in /**src**/**Figures**. The code is **Figures_Alg1.jl** and the functions **Figure1_2a** and **Figure1_2b**. The functions take the dimension as an argument.

[9]:
```
Figure1_2a(15)
```

```
testing $\tau_0$. n=15, p=5.00000e-01
```

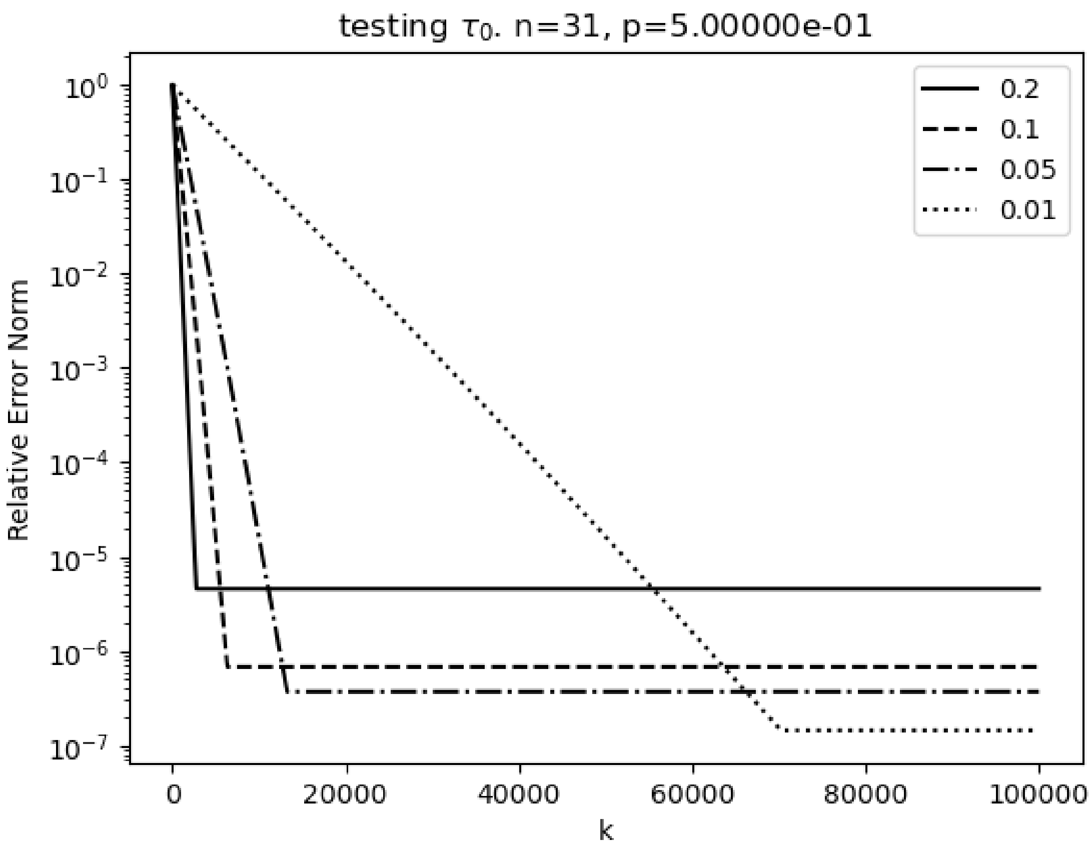


[9]: PyObject Text(0.5, 1.0, 'testing $\\tau_0$. n=15, p=5.00000e-01')

We run this again with a problem size of 31x31. This requiers smaller stepsizes ans the Lipschitz constant increases by a factor of four.

[10]:
```
Figure1_2a(31)
```

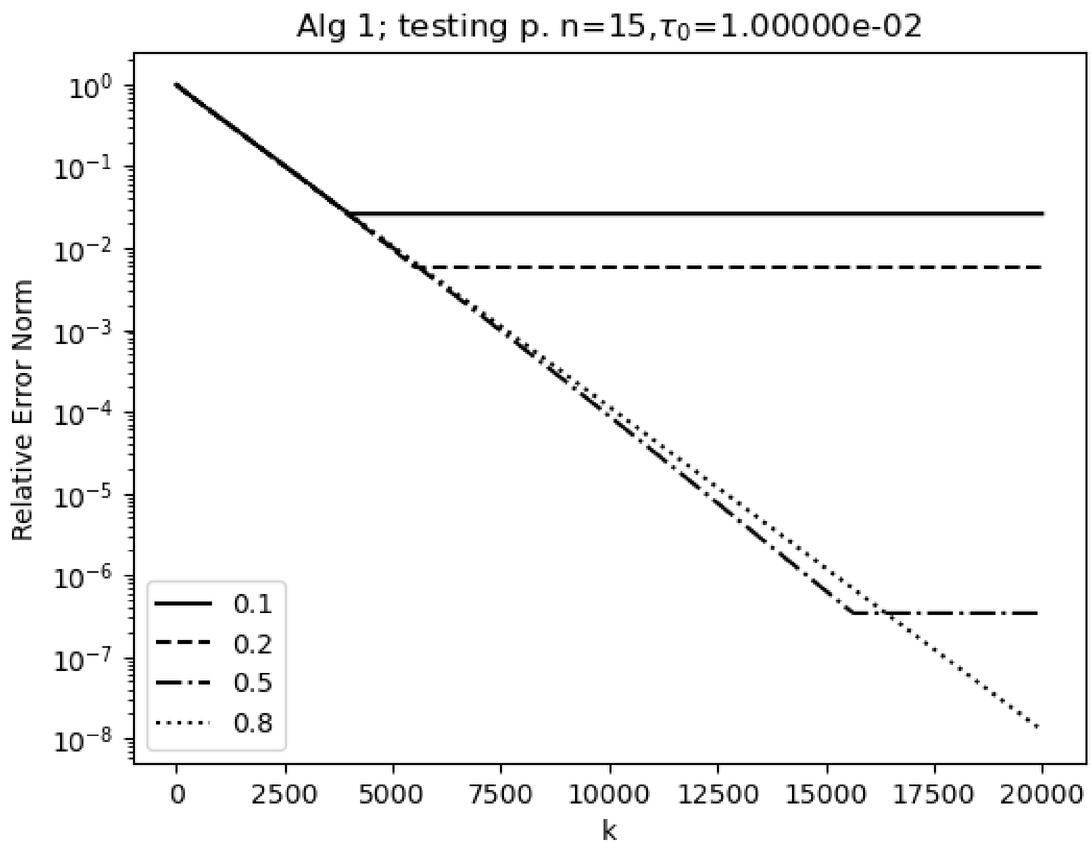
testing τ_0. n=31, p=5.00000e-01



[10]: PyObject Text(0.5, 1.0, 'testing $\\tau_0$. n=31, p=5.00000e-01')

Now we compare the effects of changing the exponent p.

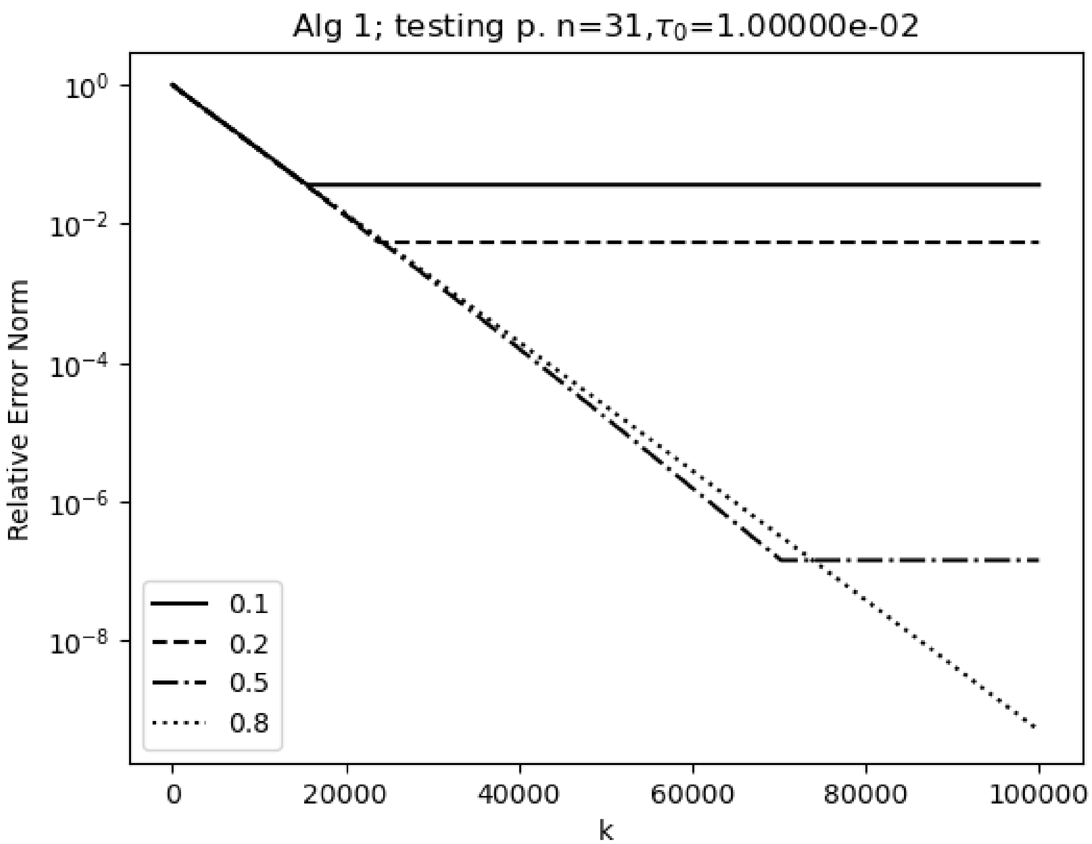
[11]:
```
Figure1_2b(15)
```



[11]: PyObject Text(0.5, 1.0, 'Alg 1; testing p. n=15,$\\tau_0$=1.00000e-02')

And finally repeat the computation for a 31x32 grid. This will complete the computations for Example 1 + Algorithm 1.

[12]:
```
Figure1_2b(31)
```




```
[12]: PyObject Text(0.5, 1.0, 'Alg 1; testing p. n=31,$\\tau_0$=1.00000e-02')
```

```
[ ]:
```