supporting notebook for nmi_02_02_iterative for validation of example 24 output and the SOR algorithm, in particular.

conclusion: that SOR algorithm in sauer2 is incorrect/incomplete; that final plot is not of infinity-norm.

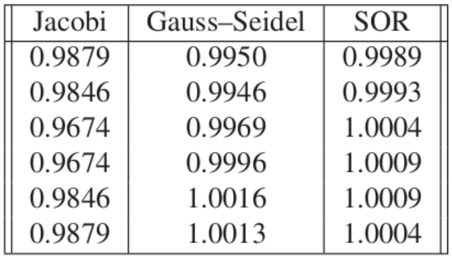
```
if __name__ == "__main__":⋯
```

```
system solution: [1. 1. 1. 1. 1. 1.]

jac step 1  [0.83333333 0.5        0.33333333 0.33333333 0.5        0.83333333]
jac step 2  [0.86111111 0.80555556 0.61111111 0.61111111 0.80555556 0.86111111]
jac step 3  [0.95833333 0.85648148 0.80555556 0.80555556 0.85648148 0.95833333]
jac step 4  [0.95910494 0.94521605 0.88734568 0.88734568 0.94521605 0.95910494]
jac step 5  [0.98855453 0.95794753 0.94418724 0.94418724 0.95794753 0.98855453]
jac step 6  [0.98789009 0.98458933 0.96737826 0.96737826 0.98458933 0.98789009]

gas step 1  [0.83333333 0.77777778 0.59259259 0.5308642  0.5473251  0.87688615]
gas step 2  [0.9464449  0.92179165 0.81755195 0.78829235 0.90142756 0.97606837]
gas step 3  [0.97791915 0.94825244 0.9121816  0.93786972 0.97993729 0.99699257]
gas step 4  [0.98325205 0.96848833 0.96878602 0.98290777 0.99855206 1.00230868]
gas step 5  [0.98911133 0.98620711 0.98970496 0.99608567 1.0017636  1.00240264]
gas step 6  [0.99500193 0.99460836 0.99689801 0.99955387 1.00155078 1.00134994]

sor step 1  [0.91666667 0.88611111 0.69157407 0.62024383 0.61496903 0.97409976]
sor step 2  [0.97132245 0.95837329 0.87633554 0.85145396 0.98217102 1.00131028]
sor step 3  [0.98736441 0.95745463 0.9422996  0.9871605  1.0053555  1.00414918]
sor step 4  [0.98490291 0.97658028 0.99247499 1.00048846 1.00545854 1.00435435]
sor step 5  [0.99212418 0.99569427 0.99935284 1.00171532 1.00246908 1.00191379]
sor step 6  [0.99885795 0.99932187 1.00044502 1.00089697 1.00090803 1.00035094]
```



Jacobi	Gauss–Seidel	SOR
0.9879	0.9950	0.9989
0.9846	0.9946	0.9993
0.9674	0.9969	1.0004
0.9674	0.9996	1.0009
0.9846	1.0016	1.0009
0.9879	1.0013	1.0004

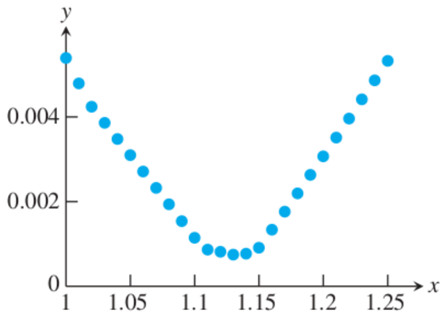
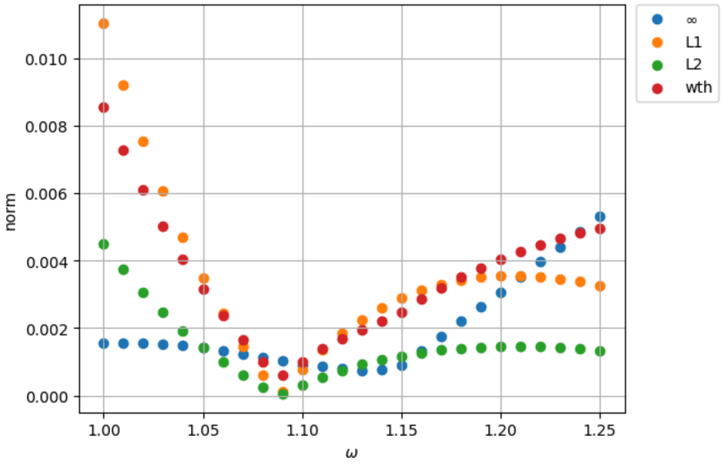


Figure 2.3 Infinity norm error after six steps of SOR in Example 2.24, as a function of over-relaxation parameter ω. Gauss–Seidel corresponds to $\omega = 1$. Minimum error occurs for $\omega \approx 1.13$

```
# requires execution of previous cell

if __name__ == ""__main__::
  import matplotlib.pyplot as plt
```

```
|    i |     ω |    Δ inf-norm |    Δ L1-norm |    Δ L2-norm |
|-----|------|--------------|-------------|-------------|
|    1 | 1     |  0.00155078  | 0.0110371    | 0.00449611   |
|    2 | 1.01  |  0.00156893  | 0.00920453   | 0.00374942   |
|    3 | 1.02  |  0.00156105  | 0.00754652   | 0.00307386   |
|    4 | 1.03  |  0.00153027  | 0.00605072   | 0.0024644    |
|    5 | 1.04  |  0.00147958  | 0.00470545   | 0.00191626   |
|    6 | 1.05  |  0.00141185  | 0.00349963   | 0.00142493   |
|    7 | 1.06  |  0.0013298   | 0.00242285   | 0.00098616   |
|    8 | 1.07  |  0.00123601  | 0.00146531   | 0.000595961  |
|    9 | 1.08  |  0.00113293  | 0.000617815  | 0.000250581  |
|   10 | 1.09  |  0.00102288  | 0.000128212  | 5.34801e-05  |
|   11 | 1.1   |  0.00090803  | 0.000780776  | 0.000319488  |
|   12 | 1.11  |  0.00086417  | 0.00134731   | 0.000550474  |
|   13 | 1.12  |  0.00081327  | 0.00183471   | 0.000749247  |
|   14 | 1.13  |  0.000746841 | 0.00224932   | 0.0009184    |
|   15 | 1.14  |  0.000770714 | 0.00259701   | 0.00106032   |
|   16 | 1.15  |  0.000910315 | 0.00288314   | 0.0011772    |
|   17 | 1.16  |  0.0013337   | 0.00311264   | 0.00127104   |
|   18 | 1.17  |  0.00176139  | 0.00328998   | 0.00134368   |
|   19 | 1.18  |  0.00219329  | 0.00341927   | 0.00139678   |
|   20 | 1.19  |  0.00262933  | 0.00350422   | 0.00143186   |
|   21 | 1.2   |  0.0030694   | 0.00354822   | 0.00145031   |
|   22 | 1.21  |  0.00351337  | 0.00355434   | 0.00145339   |
|   23 | 1.22  |  0.00396111  | 0.00352542   | 0.00144225   |
|   24 | 1.23  |  0.00441248  | 0.00346402   | 0.00141797   |
|   25 | 1.24  |  0.00486735  | 0.00337254   | 0.00138153   |
|   26 | 1.25  |  0.00532558  | 0.00325322   | 0.00133386   |
```


norm
ω
∞
L1
L2
wth