1.

```
python3 mai...                                   Ask Assistant   57s • Just now
> Environment updated. Reloading shell...
Converged in 95 iterations

Numerical solution matrix u(x,y):
          0.000     0.314     0.628     0.942     1.257  1.571
x\y
0.000  1.000000  0.951057  0.809017  0.587785  0.309017    0.0
0.314  0.951057  0.753225  0.564621  0.368084  0.172806    0.0
0.628  0.809017  0.555908  0.347640  0.176348  0.053086    0.0
0.942  0.587785  0.333231  0.132647 -0.004976 -0.058882    0.0
1.257  0.309017  0.085806 -0.086863 -0.182347 -0.166748    0.0
1.571  0.000000 -0.173197 -0.305633 -0.353912 -0.269910    0.0
1.885 -0.309017 -0.424258 -0.511151 -0.511645 -0.364162    0.0
2.199 -0.587785 -0.645220 -0.686178 -0.642021 -0.441312    0.0
2.513 -0.809017 -0.814475 -0.809947 -0.724389 -0.486321    0.0
2.827 -0.951057 -0.915787 -0.858894 -0.725487 -0.467874    0.0
3.142 -1.000000 -0.951057 -0.809017 -0.587785 -0.309017    0.0
```

2.

```
python3 mai...                                   Ask Assistant   1s • Just now
> Environment updated. Reloading shell...
                0.5           0.6           0.7           0.8           0.9           1.0    1.1
t \ r
0.0    0.000000e+00  2.000000e+01  4.000000e+01  6.000000e+01  8.000000e+01  1.000000e+02  120.0
0.5    3.359000e+02  4.366700e+02  3.971400e+02  3.725000e+02  3.577800e+02  3.500000e+02  120.0
1.0   -1.266307e+04 -1.646199e+04  1.684350e+03  1.305040e+03  1.069580e+03 -2.891389e+04  140.0
1.5    2.212421e+06  2.876147e+06 -2.155387e+06  1.448336e+04 -3.927286e+06  7.344946e+06  160.0
2.0   -5.804072e+08 -7.545294e+08  8.724695e+08 -7.777834e+08  1.948729e+09 -2.295236e+09  180.0
2.5    1.842459e+11  2.395197e+11 -4.089916e+11  5.547262e+11 -8.798988e+11  8.029253e+11  200.0
3.0   -7.224091e+13 -9.391318e+13  2.039340e+14 -3.029171e+14  3.905248e+14 -3.044164e+14  220.0
3.5    3.286372e+16  4.272284e+16 -1.022495e+17  1.511914e+17 -1.731678e+17  1.221745e+17  240.0
4.0   -1.593741e+19 -2.071863e+19  5.066787e+19 -7.262787e+19  7.708801e+19 -5.098513e+19  260.0
4.5    7.841578e+21  1.019405e+22 -2.474809e+22  3.426023e+22 -3.449624e+22  2.184950e+22  280.0
5.0   -3.839314e+24 -4.991108e+24  1.193394e+25 -1.601250e+25  1.551710e+25 -9.536954e+24  300.0
5.5    1.860706e+27  2.418918e+27 -5.695406e+27  7.446484e+27 -7.012469e+27  4.217357e+27  320.0
6.0   -8.925828e+29 -1.160358e+30  2.696220e+30 -3.452948e+30  3.181660e+30 -1.882852e+30  340.0
6.5    4.244362e+32  5.517671e+32 -1.268492e+33  1.598312e+33 -1.448305e+33  8.466524e+32  360.0
7.0   -2.004089e+35 -2.605316e+35  5.939584e+35 -7.389840e+35  6.610286e+35 -3.828027e+35  380.0
7.5    9.410825e+37  1.223407e+38 -2.771070e+38  3.414044e+38 -3.023460e+38  1.738150e+38  400.0
8.0   -4.400347e+40 -5.720451e+40  1.289237e+41 -1.576385e+41  1.385228e+41 -7.918353e+40  420.0
8.5    2.050791e+43  2.666028e+43 -5.985411e+43  7.275779e+43 -6.355009e+43  3.616628e+43  440.0
9.0   -9.533684e+45 -1.239379e+46  2.774252e+46 -3.357109e+46  2.918537e+46 -1.655198e+46  460.0
9.5    4.423424e+48  5.750451e+48 -1.284258e+49  1.548646e+49 -1.341435e+49  7.587205e+48  480.0
10.0  -2.049316e+51 -2.664111e+51  5.939345e+51 -7.142712e+51  6.169526e+51 -3.482169e+51  500.0
```

3.

```
python3 mai...
> Environment updated. Reloading shell...
✅ Converged after 128 iterations.

Numerical result (Temperature field T[r, θ]):
Partial output (first 10 r rows × first 10 θ columns):

   0.00    50.00    50.00    50.00    50.00    50.00    50.00    50.00    50.00    50.00
   0.00    14.82    28.85    41.88    53.62    63.84    72.46    79.49    85.05    89.32
   0.00    14.80    29.08    42.38    54.32    64.69    73.38    80.44    85.98    90.19
   0.00    15.03    29.51    42.96    55.01    65.42    74.11    81.11    86.57    90.69
   0.00    15.26    29.95    43.57    55.72    66.16    74.83    81.77    87.14    91.16
   0.00    15.50    30.41    44.18    56.43    66.91    75.56    82.43    87.71    91.63
   0.00    15.75    30.87    44.81    57.16    67.67    76.29    83.09    88.27    92.08
   0.00    16.01    31.35    45.46    57.90    68.44    77.03    83.75    88.83    92.53
   0.00    16.27    31.85    46.12    58.66    69.22    77.77    84.41    89.38    92.97
   0.00    16.54    32.36    46.80    59.44    70.02    78.51    85.06    89.92    93.40
```

4.

```
Numerical solution p(x, t):
x \ t |   0.00    0.10    0.20    0.30    0.40    0.50
------------------------------------------------------
 0.00 |  1.000   1.000   1.000   1.000   1.000   1.000
 0.10 |  0.809   1.024   1.039   1.039   1.024   1.000
 0.20 |  0.309   0.848   1.062   1.062   1.039   1.000
 0.30 | -0.309   0.348   0.871   1.062   1.039   1.000
 0.40 | -0.809  -0.285   0.348   0.848   1.024   1.000
 0.50 | -1.000  -0.809  -0.309   0.309   0.809   1.000
 0.60 | -0.809  -1.024  -0.848  -0.348   0.285   2.000
 0.70 | -0.309  -0.848  -1.062  -0.871   0.843   2.000
 0.80 |  0.309  -0.348  -0.871   0.129   0.843   2.000
 0.90 |  0.809   0.285   0.843   0.843   1.285   2.000
 1.00 |  2.000   2.000   2.000   2.000   2.000   2.000
```