HW5

1.(a) t Euler Exact Error (Euler)

1.0 0.000000 0.000000 0.000000

1.1 0.100000 0.105160 0.005160

1.2 0.209917 0.221243 0.011325

1.3 0.330471 0.349121 0.018651

1.4 0.462354 0.489682 0.027328

1.5 0.606285 0.643875 0.037590

1.6 0.763041 0.812753 0.049711

1.7 0.933475 0.997494 0.064019

1.8 1.118537 1.199439 0.080902

1.9 1.319293 1.420116 0.100823

2.0 1.536943 1.661282 0.124338

(b) t Taylor 2nd Exact Error (Taylor 2nd)

1.0 0.000000 0.000000 0.000000

1.1 0.105000 0.105160 0.000160

1.2 0.220919 0.221243 0.000324

1.3 0.348612 0.349121 0.000509

1.4 0.488954 0.489682 0.000728

1.5 0.642883 0.643875 0.000993

1.6 0.811438 0.812753 0.001315

1.7 0.995787 0.997494 0.001707

1.8 1.197252 1.199439 0.002187

1.9 1.417344 1.420116 0.002772

2.0 1.657795 1.661282 0.003487

2. ===== RK4 結果 (h = 0.05) =====

t | u1\_RK4 | u1\_exact | err\_u1 || u2\_RK4 | u2\_exact | err\_u2

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0.00 | 1.33333333 | 1.33333333 | 0.00e+00 || 0.66666667 | 0.66666667 | 1.11e-16

0.05 | 1.72188026 | 1.91205863 | 1.90e-01 || -0.49959934 | -0.90907659 | 4.09e-01

0.10 | 1.72691505 | 1.79306259 | 6.61e-02 || -0.83259771 | -1.03200245 | 1.99e-01

0.15 | 1.61716063 | 1.60196676 | 1.52e-02 || -0.89037299 | -0.96145871 | 7.11e-02

0.20 | 1.48168729 | 1.42390240 | 5.78e-02 || -0.86104209 | -0.87468103 | 1.36e-02

0.25 | 1.34894503 | 1.26764562 | 8.13e-02 || -0.80750453 | -0.79522077 | 1.23e-02

0.30 | 1.22706330 | 1.13157652 | 9.55e-02 || -0.75034063 | -0.72499857 | 2.53e-02

0.35 | 1.11747812 | 1.01299856 | 1.04e-01 || -0.69588591 | -0.66305963 | 3.28e-02

0.40 | 1.01952546 | 0.90940859 | 1.10e-01 || -0.64573176 | -0.60821421 | 3.75e-02

0.45 | 0.93197667 | 0.81862953 | 1.13e-01 || -0.59993424 | -0.55938925 | 4.05e-02

0.50 | 0.85354051 | 0.73878784 | 1.15e-01 || -0.55809249 | -0.51565767 | 4.24e-02

0.55 | 0.78301727 | 0.66827466 | 1.15e-01 || -0.51970627 | -0.47622475 | 4.35e-02

0.60 | 0.71933702 | 0.60570965 | 1.14e-01 || -0.48429030 | -0.44041076 | 4.39e-02

0.65 | 0.66156029 | 0.54990941 | 1.12e-01 || -0.45140706 | -0.40763534 | 4.38e-02

0.70 | 0.60886766 | 0.49986025 | 1.09e-01 || -0.42067262 | -0.37740382 | 4.33e-02

0.75 | 0.56054684 | 0.45469474 | 1.06e-01 || -0.39175408 | -0.34929551 | 4.25e-02

0.80 | 0.51598005 | 0.41367148 | 1.02e-01 || -0.36436468 | -0.32295352 | 4.14e-02

0.85 | 0.47463257 | 0.37615771 | 9.85e-02 || -0.33825859 | -0.29807605 | 4.02e-02

0.90 | 0.43604262 | 0.34161435 | 9.44e-02 || -0.31322610 | -0.27440884 | 3.88e-02

0.95 | 0.39981231 | 0.30958300 | 9.02e-02 || -0.28908926 | -0.25173868 | 3.74e-02

1.00 | 0.36559983 | 0.27967491 | 8.59e-02 || -0.26569799 | -0.22988784 | 3.58e-02