

數值方法作業五

第一題

```
PS C:\Users\user\Documents\數值方法\hw5> & C:/Users/user/AppData/Local/Programs/Python/Python312/python.exe c:/Users/user/Documents/數值方法/hw5.py
t      Euler    Taylor    Exact    Euler Error    Taylor Error
1.0    0.000000    0.000000    0.000000    0.000000    0.000000
1.1    0.100000    0.105000    0.105000    0.105160    0.000160
1.2    0.209917    0.220919    0.220919    0.221243    0.011325
1.3    0.330471    0.348612    0.348612    0.349121    0.018651
1.4    0.462354    0.488954    0.488954    0.489682    0.027328
1.5    0.606285    0.642883    0.642883    0.643875    0.037590
1.6    0.763041    0.811438    0.811438    0.812753    0.049711
1.7    0.933475    0.995787    0.995787    0.997494    0.064019
1.8    1.118537    1.197252    1.197252    1.199439    0.080902
1.9    1.319293    1.417344    1.417344    1.420116    0.100823
2.0    1.536943    1.657795    1.657795    1.661282    0.124338
0 PS C:\Users\user\Documents\數值方法\hw5>
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第二題

```
PS C:\Users\user\Documents\數值方法\hw5> & C:/Users/user/AppData/Local/Programs/Python/Python312/python.exe c:/Users/user/Documents/數值方法/hw5.py
h = 0.1
t      u1_RK4    u2_RK4    u1_Exact    u2_Exact    u1_Error    u2_Error
0.0    1.333333    0.666667    1.333333    0.666667    0.000000    0.000000
0.1    -3.052437    8.989305    1.788581    1.788581    -1.023039    4.841018
0.2    -23.847795    51.192704    1.423701    1.423701    -0.874278    25.271496
0.3    -130.165202    269.269193    1.131570    1.131570    -0.724985    131.296771
0.4    -680.231485    1399.368584    0.909408    0.909408    -0.608214    681.140893
0.5    -3531.299585    7258.241839    0.738788    0.738788    -0.515658    3532.038373
0.6    -18312.795052    37634.955483    0.605710    0.605710    -0.440411    18313.400762
0.7    -94951.331907    195131.871735    0.499860    0.499860    -0.377404    94951.831768
0.8    -492306.465639    1011721.872078    0.413671    0.413671    -0.322954    492306.879311
0.9    -2552513.623867    5245578.826590    0.341614    0.341614    -0.274409    2552513.965482
1.0    -13234278.789168    27197287.206587    0.279675    0.279675    -0.229888    13234279.068843
h = 0.05
t      u1_RK4    u2_RK4    u1_Exact    u2_Exact    u1_Error    u2_Error
0.00    1.333333    0.666667    1.333333    0.666667    0.000000    0.000000
0.05    1.721880    -0.499599    1.897096    1.897096    -0.879150    0.175215
0.10    1.726915    -0.832598    1.788581    1.788581    -1.023039    0.061666
0.15    1.617161    -0.890373    1.600959    1.600959    -0.959444    0.016201
0.20    1.481687    -0.861042    1.423701    1.423701    -0.874278    0.057986
0.25    1.348945    -0.807505    1.267608    1.267608    -0.795145    0.081337
0.30    1.227063    -0.750341    1.131570    1.131570    -0.724985    0.095494
0.35    1.117478    -0.695886    1.012997    1.012997    -0.663057    0.104481
0.40    1.019525    -0.645732    0.909408    0.909408    -0.608214    0.110117
0.45    0.931977    -0.599934    0.818629    0.818629    -0.559389    0.113347
0.50    0.853541    -0.558092    0.738788    0.738788    -0.515658    0.114753
0.55    0.783017    -0.519706    0.668275    0.668275    -0.476225    0.114743
0.60    0.719337    -0.484290    0.605710    0.605710    -0.440411    0.113627
0.65    0.661560    -0.451407    0.549909    0.549909    -0.407635    0.111651
0.70    0.608868    -0.420673    0.499860    0.499860    -0.377404    0.109007
0.75    0.560547    -0.391754    0.454695    0.454695    -0.349296    0.105852
0.80    0.515980    -0.364365    0.413671    0.413671    -0.322954    0.102309
0.85    0.474633    -0.338259    0.376158    0.376158    -0.298076    0.098475
0.90    0.436043    -0.313226    0.341614    0.341614    -0.274409    0.094428
0.95    0.399812    -0.289089    0.309583    0.309583    -0.251739    0.090229
1.00    0.365600    -0.265698    0.279675    0.279675    -0.229888    0.085925
```