Assignment 6 of CISC 2002

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1

1.1

```matlab
function x=Assignment_7_1_x(t)
    x=2/(1+exp(-2*t));
end
```

Listing 1: Code

```matlab
function y=Assignment_7_1_f(x)
    y=2*x-x^2;
end
```

Listing 2: Code

```matlab
clear
delta=0.1
n=0;
x0=1;
x1=0;
while (n*delta<=1)
    error=x0-Assignment_7_1_x(n*delta);
    x1=x0+delta*Assignment_7_1_f(x0);
    x0=x1;
    n=n+1;
    fprintf('%10.5f,%10.5f\n',x1,error)
end
disp("————————————————————")
clear
delta=0.01
n=0;
x0=1;
x1=0;
while (n*delta<=1)
    error=x0-Assignment_7_1_x(n*delta);
    x1=x0+delta*Assignment_7_1_f(x0);
    x0=x1;
    n=n+1;
    fprintf('%10.5f,%10.5f\n',x1,error)
```

```
25  end
```

Listing 3: Code

```
1
2   delta =
3
4       0.1000
5
6     1.10000,    0.00000
7     1.19900,    0.00033
8     1.29504,    0.00162
9     1.38634,    0.00373
10    1.47141,    0.00639
11    1.54919,    0.00929
12    1.61903,    0.01214
13    1.68071,    0.01466
14    1.73437,    0.01667
15    1.78044,    0.01807
16    1.81953,    0.01885
17  ————————————————————
18
19  delta =
20
21       0.0100
22
23    1.01000,    0.00000
24    1.02000,    0.00000
25    1.03000,    0.00000
26    1.03999,    0.00000
27    1.04997,    0.00001
28    1.05995,    0.00001
29    1.06991,    0.00002
30    1.07986,    0.00002
31    1.08980,    0.00003
32    1.09972,    0.00004
33    1.10962,    0.00005
34    1.11950,    0.00006
35    1.12935,    0.00007
36    1.13919,    0.00008
37    1.14899,    0.00009
38    1.15877,    0.00011
39    1.16852,    0.00012
40    1.17823,    0.00014
41    1.18792,    0.00015
42    1.19756,    0.00017
43    1.20717,    0.00019
44    1.21674,    0.00021
45    1.22627,    0.00023
46    1.23576,    0.00025
47    1.24521,    0.00027
48    1.25461,    0.00029
49    1.26396,    0.00031
50    1.27326,    0.00033
51    1.28251,    0.00036
```

```
 52    1.29172,    0.00038
 53    1.30086,    0.00040
 54    1.30996,    0.00043
 55    1.31900,    0.00045
 56    1.32798,    0.00048
 57    1.33691,    0.00050
 58    1.34577,    0.00053
 59    1.35457,    0.00056
 60    1.36332,    0.00058
 61    1.37200,    0.00061
 62    1.38061,    0.00064
 63    1.38916,    0.00066
 64    1.39765,    0.00069
 65    1.40607,    0.00072
 66    1.41442,    0.00075
 67    1.42270,    0.00078
 68    1.43092,    0.00080
 69    1.43906,    0.00083
 70    1.44713,    0.00086
 71    1.45513,    0.00089
 72    1.46306,    0.00092
 73    1.47092,    0.00094
 74    1.47870,    0.00097
 75    1.48641,    0.00100
 76    1.49404,    0.00103
 77    1.50160,    0.00105
 78    1.50908,    0.00108
 79    1.51649,    0.00111
 80    1.52383,    0.00113
 81    1.53108,    0.00116
 82    1.53826,    0.00119
 83    1.54536,    0.00121
 84    1.55239,    0.00124
 85    1.55934,    0.00126
 86    1.56621,    0.00129
 87    1.57300,    0.00131
 88    1.57972,    0.00133
 89    1.58636,    0.00136
 90    1.59292,    0.00138
 91    1.59941,    0.00140
 92    1.60581,    0.00142
 93    1.61214,    0.00144
 94    1.61840,    0.00147
 95    1.62457,    0.00149
 96    1.63067,    0.00151
 97    1.63669,    0.00153
 98    1.64264,    0.00154
 99    1.64851,    0.00156
100    1.65430,    0.00158
101    1.66002,    0.00160
102    1.66567,    0.00161
103    1.67124,    0.00163
104    1.67673,    0.00164
105    1.68215,    0.00166
106    1.68750,    0.00167
```

```
107     1.69277,      0.00169
108     1.69797,      0.00170
109     1.70310,      0.00171
110     1.70816,      0.00173
111     1.71314,      0.00174
112     1.71806,      0.00175
113     1.72290,      0.00176
114     1.72767,      0.00177
115     1.73238,      0.00178
116     1.73701,      0.00178
117     1.74158,      0.00179
118     1.74608,      0.00180
119     1.75052,      0.00181
120     1.75488,      0.00181
121     1.75919,      0.00182
122     1.76342,      0.00182
123     1.76759,      0.00183
```

Listing 4: Code

1.2

```
1   clear
2   delta=0.1
3   n=0;
4   x0=1;
5   x1=0;
6   while (n*delta<=1)
7       error=x0−Assignment_7_1_x(n*delta);
8       k1=delta*Assignment_7_1_f(x0);
9       k2=delta*Assignment_7_1_f(x0+k1);
10      x1=x0+(k1+k2)/2;
11      x0=x1;
12      n=n+1;
13      fprintf('%10.5f,%10.5f\n',x1,error)
14  end
15  disp("———————————————————————")
16  clear
17  delta=0.01
18  n=0;
19  x0=1;
20  x1=0;
21  while (n*delta<=1)
22      error=x0−Assignment_7_1_x(n*delta);
23      k1=delta*Assignment_7_1_f(x0);
24      k2=delta*Assignment_7_1_f(x0+k1);
25      x1=x0+(k1+k2)/2;
26      x0=x1;
27      n=n+1;
28      fprintf('%10.5f,%10.5f\n',x1,error)
29  end
```

Listing 5: Code

4

```
1
2  delta =
3
4      0.1000
5
6    1.09950,    0.00000
7    1.19703,   -0.00017
8    1.29080,   -0.00034
9    1.37926,   -0.00052
10   1.46126,   -0.00069
11   1.53604,   -0.00086
12   1.60324,   -0.00100
13   1.66281,   -0.00113
14   1.71500,   -0.00123
15   1.76027,   -0.00130
16   1.79917,   -0.00133
17 ——————————————————
18
19 delta =
20
21     0.0100
22
23   1.01000,    0.00000
24   1.02000,   -0.00000
25   1.02999,   -0.00000
26   1.03998,   -0.00000
27   1.04996,   -0.00000
28   1.05993,   -0.00000
29   1.06988,   -0.00000
30   1.07983,   -0.00000
31   1.08976,   -0.00000
32   1.09967,   -0.00000
33   1.10956,   -0.00000
34   1.11943,   -0.00000
35   1.12927,   -0.00000
36   1.13909,   -0.00000
37   1.14888,   -0.00000
38   1.15865,   -0.00000
39   1.16838,   -0.00000
40   1.17808,   -0.00000
41   1.18774,   -0.00000
42   1.19737,   -0.00000
43   1.20696,   -0.00000
44   1.21651,   -0.00000
45   1.22602,   -0.00000
46   1.23549,   -0.00000
47   1.24491,   -0.00000
48   1.25429,   -0.00000
49   1.26362,   -0.00000
50   1.27290,   -0.00000
51   1.28213,   -0.00000
52   1.29131,   -0.00000
53   1.30043,   -0.00000
54   1.30950,   -0.00001
55   1.31852,   -0.00001
```

```
 56    1.32747,    −0.00001
 57    1.33637,    −0.00001
 58    1.34521,    −0.00001
 59    1.35399,    −0.00001
 60    1.36270,    −0.00001
 61    1.37135,    −0.00001
 62    1.37994,    −0.00001
 63    1.38847,    −0.00001
 64    1.39692,    −0.00001
 65    1.40531,    −0.00001
 66    1.41364,    −0.00001
 67    1.42189,    −0.00001
 68    1.43008,    −0.00001
 69    1.43819,    −0.00001
 70    1.44624,    −0.00001
 71    1.45421,    −0.00001
 72    1.46211,    −0.00001
 73    1.46994,    −0.00001
 74    1.47769,    −0.00001
 75    1.48537,    −0.00001
 76    1.49298,    −0.00001
 77    1.50051,    −0.00001
 78    1.50797,    −0.00001
 79    1.51535,    −0.00001
 80    1.52266,    −0.00001
 81    1.52989,    −0.00001
 82    1.53704,    −0.00001
 83    1.54412,    −0.00001
 84    1.55112,    −0.00001
 85    1.55804,    −0.00001
 86    1.56489,    −0.00001
 87    1.57166,    −0.00001
 88    1.57835,    −0.00001
 89    1.58497,    −0.00001
 90    1.59151,    −0.00001
 91    1.59797,    −0.00001
 92    1.60436,    −0.00001
 93    1.61067,    −0.00001
 94    1.61690,    −0.00001
 95    1.62305,    −0.00001
 96    1.62913,    −0.00001
 97    1.63514,    −0.00001
 98    1.64107,    −0.00001
 99    1.64692,    −0.00001
100    1.65270,    −0.00001
101    1.65840,    −0.00001
102    1.66403,    −0.00001
103    1.66958,    −0.00001
104    1.67506,    −0.00001
105    1.68046,    −0.00001
106    1.68580,    −0.00001
107    1.69106,    −0.00001
108    1.69625,    −0.00001
109    1.70136,    −0.00001
110    1.70641,    −0.00001
```

```
111      1.71138,    −0.00001
112      1.71629,    −0.00001
113      1.72112,    −0.00001
114      1.72589,    −0.00001
115      1.73058,    −0.00001
116      1.73521,    −0.00001
117      1.73977,    −0.00001
118      1.74426,    −0.00001
119      1.74869,    −0.00001
120      1.75305,    −0.00001
121      1.75735,    −0.00001
122      1.76158,    −0.00001
123      1.76575,    −0.00001
```

Listing 6: Code

1.3