

ME 345
Professor Frank Fisher
Euler Method - (approx) numerical solution to DEQs

[same problem, but with a smaller time step]

[here I hard code in the exact solution]

$xs' =$	-5	xs
timestep	0.1	

step	time	xs (current)	xs' (current)	xs (future)
1	0	2	-10	1
2	0.1	1	-5	0.5
3	0.2	0.5	-2.5	0.25
4	0.3	0.25	-1.25	0.125
5	0.4	0.125	-0.625	0.0625
6	0.5	0.0625	-0.3125	0.03125
7	0.6	0.03125	-0.15625	0.015625

$xs' =$	-5	xs
timestep	0.01	

step	time	xs (current)	xs' (current)	xs (future)
1	0	2	-10	1.9
2	0.01	1.9	-9.5	1.805
3	0.02	1.805	-9.025	1.71475
4	0.03	1.71475	-8.57375	1.6290125
5	0.04	1.6290125	-8.1450625	1.54756188
6	0.05	1.54756188	-7.73780938	1.47018378
7	0.06	1.47018378	-7.35091891	1.39667459
8	0.07	1.39667459	-6.98337296	1.32684086
9	0.08	1.32684086	-6.63420431	1.26049882
10	0.09	1.26049882	-6.3024941	1.19747388
11	0.1	1.19747388	-5.98736939	1.13760018
12	0.11	1.13760018	-5.68800092	1.08072018
13	0.12	1.08072018	-5.40360088	1.02668417
14	0.13	1.02668417	-5.13342083	0.97534996
15	0.14	0.97534996	-4.87674979	0.92658246
16	0.15	0.92658246	-4.6329123	0.88025334
17	0.16	0.88025334	-4.40126669	0.83624067
18	0.17	0.83624067	-4.18120335	0.79442864
19	0.18	0.79442864	-3.97214318	0.75470721
20	0.19	0.75470721	-3.77353603	0.71697184
21	0.2	0.71697184	-3.58485922	0.68112325
22	0.21	0.68112325	-3.40561626	0.64706709
23	0.22	0.64706709	-3.23533545	0.61471374
24	0.23	0.61471374	-3.07356868	0.58397805
25	0.24	0.58397805	-2.91989024	0.55477915
26	0.25	0.55477915	-2.77389573	0.52704019
27	0.26	0.52704019	-2.63520094	0.50068818
28	0.27	0.50068818	-2.5034409	0.47565377
29	0.28	0.47565377	-2.37826885	0.45187108
30	0.29	0.45187108	-2.25935541	0.42927753
31	0.3	0.42927753	-2.14638764	0.40781365
32	0.31	0.40781365	-2.03906826	0.38742297
33	0.32	0.38742297	-1.93711484	0.36805182
34	0.33	0.36805182	-1.8402591	0.34964923
35	0.34	0.34964923	-1.74824615	0.33216677
36	0.35	0.33216677	-1.66083384	0.31555843
37	0.36	0.31555843	-1.57779215	0.29978051
38	0.37	0.29978051	-1.49890254	0.28479148
39	0.38	0.28479148	-1.42395741	0.27055191
40	0.39	0.27055191	-1.35275954	0.25702431
41	0.4	0.25702431	-1.28512157	0.2441731
42	0.41	0.2441731	-1.22086549	0.23196444
43	0.42	0.23196444	-1.15982221	0.22036622
44	0.43	0.22036622	-1.1018311	0.20934791
45	0.44	0.20934791	-1.04673955	0.19888051
46	0.45	0.19888051	-0.99440257	0.18893649
47	0.46	0.18893649	-0.94468244	0.17948966
48	0.47	0.17948966	-0.89744832	0.17051518
49	0.48	0.17051518	-0.8525759	0.16198942
50	0.49	0.16198942	-0.80994711	0.15388995
51	0.5	0.15388995	-0.76944975	0.14619545
52	0.51	0.14619545	-0.73097727	0.13888568
53	0.52	0.13888568	-0.6944284	0.1319414
54	0.53	0.1319414	-0.65970698	0.12534433

time	position
0	2
0.01	1.90245885
0.02	1.80967484
0.03	1.72141595
0.04	1.63746151
0.05	1.55760157
0.06	1.48163644
0.07	1.40937618
0.08	1.34064009
0.09	1.2752563
0.1	1.21306132
0.11	1.15389962
0.12	1.09762327
0.13	1.04409155
0.14	0.99317061
0.15	0.94473311
0.16	0.89865793
0.17	0.85482986
0.18	0.81313932
0.19	0.77348205
0.2	0.73575888
0.21	0.6998755
0.22	0.66574217
0.23	0.63327354
0.24	0.60238842
0.25	0.57300959
0.26	0.54506359
0.27	0.51848052
0.28	0.49319393
0.29	0.46914058
0.3	0.44626032
0.31	0.42449595
0.32	0.40379304
0.33	0.38409982
0.34	0.36536705
0.35	0.34754789
0.36	0.33059778
0.37	0.31447433
0.38	0.29913724
0.39	0.28454814
0.4	0.27067057
0.41	0.25746981
0.42	0.24491286
0.43	0.23296832
0.44	0.22160632
0.45	0.21079845
0.46	0.20051769
0.47	0.19073832
0.48	0.18143591
0.49	0.17258717
0.5	0.16417
0.51	0.15616333
0.52	0.14854716
0.53	0.14130243

