

## Problem 1

(a) Euler's Method ( $h = 0.1$ )			
t	Euler_y	Exact_y	Error
1.00	0.000000	0.000000	0.000000
1.10	0.100000	0.105160	0.005160
1.20	0.209917	0.221243	0.011325
1.30	0.330471	0.349121	0.018651
1.40	0.462354	0.489682	0.027328
1.50	0.606285	0.643875	0.037590
1.60	0.763041	0.812753	0.049711
1.70	0.933475	0.997494	0.064019
1.80	1.118537	1.199439	0.080902
1.90	1.319293	1.420116	0.100823
2.00	1.536943	1.661282	0.124338

  

(b) Taylor's Method of Order 2 ( $h = 0.1$ )			
t	Taylor_y	Exact_y	Error
1.00	0.000000	0.000000	0.000000
1.10	0.105000	0.105160	0.000160
1.20	0.220919	0.221243	0.000324
1.30	0.348612	0.349121	0.000509
1.40	0.488954	0.489682	0.000728
1.50	0.642883	0.643875	0.000993
1.60	0.811438	0.812753	0.001315
1.70	0.995787	0.997494	0.001707
1.80	1.197252	1.199439	0.002187
1.90	1.417344	1.420116	0.002772
2.00	1.657795	1.661282	0.003487

## Problem 2

Results for  $h = 0.05$

t	u1_RK4	u1_exact	u1_error	u2_RK4	u2_exact	u2_error
0.000000	1.333333	1.333333	0.000000	0.666667	0.666667	0.000000
0.050000	1.721880	1.912059	0.190178	-0.499599	-0.909077	0.409477
0.100000	1.726915	1.793063	0.066148	-0.832598	-1.032002	0.199405
0.150000	1.617161	1.601967	0.015194	-0.890373	-0.961459	0.071086
0.200000	1.481687	1.423902	0.057785	-0.861042	-0.874681	0.013639
0.250000	1.348945	1.267646	0.081299	-0.807505	-0.795221	0.012284
0.300000	1.227063	1.131577	0.095487	-0.750341	-0.724999	0.025342
0.350000	1.117478	1.012999	0.104480	-0.695886	-0.663060	0.032826
0.400000	1.019525	0.909409	0.110117	-0.645732	-0.608214	0.037518
0.450000	0.931977	0.818630	0.113347	-0.599934	-0.559389	0.040545
0.500000	0.853541	0.738788	0.114753	-0.558092	-0.515658	0.042435
0.550000	0.783017	0.668275	0.114743	-0.519706	-0.476225	0.043482
0.600000	0.719337	0.605710	0.113627	-0.484290	-0.440411	0.043880
0.650000	0.661560	0.549909	0.111651	-0.451407	-0.407635	0.043772
0.700000	0.608868	0.499860	0.109007	-0.420673	-0.377404	0.043269
0.750000	0.560547	0.454695	0.105852	-0.391754	-0.349296	0.042459
0.800000	0.515980	0.413671	0.102309	-0.364365	-0.322954	0.041411
0.850000	0.474633	0.376158	0.098475	-0.338259	-0.298076	0.040183
0.900000	0.436043	0.341614	0.094428	-0.313226	-0.274409	0.038817
0.950000	0.399812	0.309583	0.090229	-0.289089	-0.251739	0.037351
1.000000	0.365600	0.279675	0.085925	-0.265698	-0.229888	0.035810

Results for  $h = 0.1$

t	u1_RK4	u1_exact	u1_error	u2_RK4	u2_exact	u2_error
0.000000	1.333333	1.333333	0.000000	0.666667	0.666667	0.000000
0.100000	-3.052437	1.793063	4.845500	8.989305	-1.032002	10.021308
0.200000	-23.847795	1.423902	25.271697	51.192704	-0.874681	52.067385
0.300000	-130.165202	1.131577	131.296778	269.269193	-0.724999	269.994192
0.400000	-680.231485	0.909409	681.140894	1399.368584	-0.608214	1399.976798
0.500000	-3531.299585	0.738788	3532.038373	7258.241839	-0.515658	7258.757497
0.600000	-18312.795052	0.605710	18313.400762	37634.955483	-0.440411	37635.395894
0.700000	-94951.331907	0.499860	94951.831768	195131.871735	-0.377404	195132.249139
0.800000	-492306.465639	0.413671	492306.879311	1011721.872078	-0.322954	1011722.195031
0.900000	-2552513.623867	0.341614	2552513.965482	5245578.826590	-0.274409	5245579.100999
1.000000	-13234278.789168	0.279675	13234279.068843	27197287.206587	-0.229888	27197287.436475