

UJUNWA FATIMA

16/ENG02/057

COMPUTER ENGINEERING

ENG 384

### QUESTION 1

Code on MATLAB:

```
function taylor
```

```
t0=0;
```

```
tn=0.5;
```

```
h=0.1;
```

```
y0=1.4;
```

```
t=t0:h:tn;
```

```
y(1)=y0
```

```
n=length(t);
```

```
for i=1:n
```

```
    dy=(2*t(i))+(y(i)^2)
```

```
    y(i+1)=y(i)+h*dy
```

```
end
```

Output:

```
>> taylor
```

y =

1.4000

dy =

1.9600

y =

1.4000 1.5960

dy =

2.7472

$$y =$$

1.4000 1.5960 1.8707

$$dy =$$

3.8996

$$y =$$

1.4000 1.5960 1.8707 2.2607

$$dy =$$

5.7107

$$y =$$

1.4000 1.5960 1.8707 2.2607 2.8317

dy =

8.8188

y =

1.4000 1.5960 1.8707 2.2607 2.8317 3.7136

dy =

14.7910

y =

1.4000 1.5960 1.8707 2.2607 2.8317 3.7136 5.1927

## QUESTION 2

First code on MATLAB:

```
function dQdt = dupeak(t,Q)

dQdt(1) = (-0.15*Q(1)) + (0.005*Q(2)) + 1;

dQdt(2) = (0.03*Q(1)) - (0.018*Q(2)) + (0.0075*Q(3));

dQdt(3) = (0.013*Q(2)) - (0.0325*Q(3));

dQdt = dQdt'
```

Second code on MATLAB:

```
commandwindow

clear

clc

close all

format short g

[t,dQ] = ode45('dupeak',[0 1200],[0 0 0])

tablee = table(t,dQ)

plot(t,dQ(:,1),'b-')

hold on

plot(t,dQ(:,2),'r-')

hold on

plot(t,dQ(:,3),'g-')
```

```

xlabel('time(min)')
ylabel('dynamic response')
grid on
grid minor
axis tight
legend('y_1','y_2','y_3')

```

OUTPUT:

dQ =

0	0	0
5.0238e-05	3.7857e-11	8.2414e-18
0.00010047	1.5143e-10	6.5931e-17
0.00015071	3.4071e-10	2.2252e-16
0.00020095	6.0571e-10	5.2745e-16
0.00045212	3.0664e-09	6.0079e-15
0.00070329	7.4198e-09	2.2614e-14
0.00095445	1.3666e-08	5.6525e-14
0.0012056	2.1804e-08	1.1392e-13
0.0024612	9.0883e-08	9.6948e-13
0.0037166	2.0726e-07	3.339e-12
0.0049717	3.7094e-07	7.9947e-12

0.0062266	5.8189e-07	1.5708e-11
0.012497	2.3456e-06	1.2715e-10
0.018762	5.2898e-06	4.3073e-10
0.025022	9.4133e-06	1.0227e-09
0.031275	1.4715e-05	1.9993e-09
0.062453	5.8851e-05	1.6008e-08
0.093484	0.00013225	5.3984e-08
0.12437	0.00023477	1.2781e-07
0.15511	0.00036624	2.493e-07
0.30666	0.0014526	1.9802e-06
0.45468	0.0032404	6.6314e-06
0.59926	0.0057112	1.5597e-05
0.74048	0.0088471	3.0227e-05
1.1639	0.022864	0.0001278
1.5571	0.042782	0.00033219
1.9223	0.068119	0.0006776
2.2614	0.098429	0.0011951
2.5916	0.13515	0.0019542
2.8971	0.17646	0.0029617
3.1799	0.22195	0.0042427
3.4416	0.27123	0.0058195
3.7884	0.3491	0.0086858

4.0984	0.43333	0.01227
4.3754	0.52305	0.016611
4.623	0.61749	0.021741
4.9209	0.7535	0.030111
5.1765	0.8956	0.040049
5.3958	1.0425	0.05157
5.5842	1.193	0.064683
5.7976	1.4001	0.084875
5.9719	1.6102	0.10788
6.114	1.8221	0.1336
6.2305	2.0342	0.16195
6.354	2.3126	0.20313
6.4498	2.5884	0.24836
6.5237	2.8606	0.29731
6.5818	3.1282	0.34969
6.6363	3.4358	0.41523
6.6783	3.7358	0.48457
6.7107	4.028	0.55723
6.7366	4.3121	0.63278
6.7635	4.6524	0.72974
6.7851	4.9805	0.82976
6.8024	5.2968	0.93218



6.8173	5.6015	1.0364
6.8349	5.9734	1.171
6.8502	6.328	1.3067
6.8633	6.6664	1.4427
6.8755	6.9894	1.5782
6.8916	7.3974	1.7575
6.9062	7.7811	1.9339
6.9191	8.1422	2.1066
6.9312	8.4822	2.2747
6.9483	8.9147	2.4962
6.9633	9.3136	2.7075
6.9753	9.6822	2.9082
6.9868	10.023	3.0981
7.0065	10.385	3.3056
7.0203	10.716	3.4986
7.0221	11.022	3.6775
7.0273	11.3	3.8432
7.0378	11.454	3.9369
7.0455	11.6	4.0262
7.0494	11.739	4.1111
7.0531	11.871	4.1919
7.0591	11.996	4.2689

7.0641	12.114	4.3422
7.0678	12.227	4.4118
7.0714	12.333	4.478
7.0774	12.467	4.5619
7.0824	12.592	4.6402
7.0854	12.709	4.7133
7.0886	12.818	4.7814
7.0978	12.938	4.8583
7.1031	13.05	4.9289
7.1002	13.154	4.9936
7.1001	13.248	5.053
7.1062	13.304	5.089
7.1099	13.357	5.1231
7.1102	13.408	5.1552
7.1108	13.457	5.1856
7.114	13.502	5.2144
7.1163	13.544	5.2417
7.1171	13.585	5.2674
7.118	13.623	5.2917
7.1211	13.668	5.3208
7.1232	13.711	5.348
7.1231	13.751	5.3731

7.1236	13.788	5.3966
7.1298	13.827	5.422
7.1325	13.863	5.4453
7.1273	13.898	5.4665
7.1249	13.929	5.4861
7.1297	13.948	5.4988
7.1322	13.967	5.5108
7.1312	13.985	5.522
7.1305	14.001	5.5326
7.1327	14.017	5.5427
7.134	14.032	5.5522
7.1338	14.046	5.5611
7.1338	14.059	5.5696
7.1359	14.074	5.5795
7.1369	14.089	5.5887
7.1359	14.102	5.5973
7.1354	14.115	5.6052
7.1404	14.127	5.6139
7.1421	14.139	5.6217
7.1367	14.152	5.6288
7.1338	14.163	5.6354
7.138	14.169	5.6399

7.1399	14.176	5.6442
7.1384	14.182	5.648
7.1372	14.188	5.6517
7.1392	14.193	5.6553
7.1402	14.198	5.6586
7.1395	14.203	5.6617
7.1391	14.208	5.6647
7.1409	14.213	5.6681
7.1417	14.218	5.6712
7.1402	14.223	5.6741
7.1394	14.227	5.6768
7.1439	14.231	5.6798
7.1454	14.235	5.6825
7.14	14.24	5.6848
7.1369	14.244	5.687
7.1457	14.245	5.6891
7.1488	14.247	5.6909
7.1397	14.252	5.6924
7.1341	14.256	5.6937
7.1409	14.256	5.6951
7.1439	14.257	5.6962
7.1407	14.259	5.6972

7.1383	14.261	5.6981
7.141	14.262	5.699
7.1423	14.263	5.6998
7.1415	14.264	5.7006
7.1409	14.266	5.7013
7.1424	14.267	5.7021
7.143	14.268	5.7029
7.142	14.269	5.7036
7.1413	14.27	5.7042
7.1439	14.271	5.705
7.1448	14.272	5.7057
7.1417	14.273	5.7063
7.14	14.275	5.7068
7.1472	14.274	5.7076
7.1494	14.274	5.7082
7.1406	14.277	5.7084
7.1355	14.279	5.7087
7.1443	14.277	5.7093
7.1477	14.277	5.7097
7.141	14.279	5.7098
7.1365	14.281	5.71
7.141	14.28	5.7103

7.143	14.28	5.7106
7.1417	14.28	5.7107
7.1406	14.281	5.7109
7.1424	14.281	5.7111
7.1431	14.281	5.7113
7.1424	14.281	5.7115
7.1418	14.282	5.7116
7.1434	14.282	5.7118
7.144	14.282	5.712
7.1424	14.282	5.7121
7.1414	14.283	5.7122
7.146	14.282	5.7125
7.1474	14.282	5.7127
7.1414	14.284	5.7127
7.1381	14.285	5.7127
7.1421	14.284	5.7129
7.1439	14.283	5.713
7.142	14.284	5.713
7.1407	14.284	5.7131
7.1425	14.284	5.7132
7.1433	14.284	5.7133
7.1425	14.284	5.7133

7.1419	14.284	5.7133
7.1435	14.284	5.7135
7.1441	14.284	5.7135
7.1425	14.285	5.7135
7.1414	14.285	5.7136
7.1458	14.284	5.7137
7.1471	14.284	5.7138
7.1416	14.285	5.7137
7.1385	14.286	5.7137
7.1472	14.284	5.7139
7.1501	14.283	5.714
7.1409	14.286	5.7138
7.1352	14.287	5.7137
7.142	14.285	5.7139
7.1449	14.285	5.714
7.1416	14.286	5.7139
7.1391	14.286	5.7139
7.1418	14.286	5.714
7.1431	14.285	5.714
7.1423	14.285	5.714
7.1416	14.286	5.714
7.143	14.285	5.7141

7.1436	14.285	5.7141
7.1426	14.285	5.7141
7.1419	14.286	5.7141
7.1444	14.285	5.7142
7.1452	14.285	5.7142
7.1422	14.286	5.7141
7.1404	14.286	5.7141
7.1476	14.284	5.7143
7.1497	14.284	5.7143
7.1409	14.286	5.7141
7.1358	14.287	5.714
7.1446	14.285	5.7142
7.148	14.284	5.7143
7.1413	14.286	5.7142
7.1367	14.287	5.7141
7.1412	14.286	5.7142
7.1432	14.286	5.7142
7.1419	14.286	5.7142
7.1408	14.286	5.7142
7.1425	14.286	5.7142
7.1433	14.286	5.7142
7.1425	14.286	5.7142



7.142	14.286	5.7142
7.1436	14.285	5.7143
7.1441	14.285	5.7143
7.1425	14.286	5.7142
7.1415	14.286	5.7142
7.1461	14.285	5.7143
7.1474	14.285	5.7144
7.1415	14.286	5.7142
7.1382	14.287	5.7141
7.1422	14.286	5.7142
7.1439	14.285	5.7143
7.1421	14.286	5.7142
7.1407	14.286	5.7142
7.1426	14.286	5.7143
7.1433	14.286	5.7143
7.1425	14.286	5.7143
7.1419	14.286	5.7142
7.1436	14.286	5.7143
7.1441	14.285	5.7143
7.1425	14.286	5.7143
7.1415	14.286	5.7142
7.1458	14.285	5.7143

7.1471	14.285	5.7144
7.1416	14.286	5.7142
7.1385	14.287	5.7142
7.1472	14.285	5.7144
7.1501	14.284	5.7145
7.1409	14.286	5.7142
7.1353	14.287	5.7141
7.142	14.286	5.7143
7.1449	14.285	5.7143
7.1416	14.286	5.7142
7.1392	14.287	5.7142
7.1417	14.286	5.7143
7.1429	14.286	5.7143
7.1423	14.286	5.7143
7.1417	14.286	5.7143

tablee =

269×2 table

t	dQ
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---

0	0	0	0
5.0238e-05	5.0238e-05	3.7857e-11	8.2414e-18
0.00010048	0.00010047	1.5143e-10	6.5931e-17
0.00015071	0.00015071	3.4071e-10	2.2252e-16
0.00020095	0.00020095	6.0571e-10	5.2745e-16
0.00045214	0.00045212	3.0664e-09	6.0079e-15
0.00070333	0.00070329	7.4198e-09	2.2614e-14
0.00095452	0.00095445	1.3666e-08	5.6525e-14
0.0012057	0.0012056	2.1804e-08	1.1392e-13
0.0024616	0.0024612	9.0883e-08	9.6948e-13
0.0037176	0.0037166	2.0726e-07	3.339e-12
0.0049735	0.0049717	3.7094e-07	7.9947e-12
0.0062295	0.0062266	5.8189e-07	1.5708e-11
0.012509	0.012497	2.3456e-06	1.2715e-10
0.018789	0.018762	5.2898e-06	4.3073e-10
0.025069	0.025022	9.4133e-06	1.0227e-09
0.031348	0.031275	1.4715e-05	1.9993e-09
0.062747	0.062453	5.8851e-05	1.6008e-08
0.094146	0.093484	0.00013225	5.3984e-08
0.12554	0.12437	0.00023477	1.2781e-07

0.15694	0.15511	0.00036624	2.493e-07
0.31394	0.30666	0.0014526	1.9802e-06
0.47093	0.45468	0.0032404	6.6314e-06
0.62792	0.59926	0.0057112	1.5597e-05
0.78491	0.74048	0.0088471	3.0227e-05
1.2791	1.1639	0.022864	0.0001278
1.7732	1.5571	0.042782	0.00033219
2.2674	1.9223	0.068119	0.0006776
2.7615	2.2614	0.098429	0.0011951
3.2804	2.5916	0.13515	0.0019542
3.7993	2.8971	0.17646	0.0029617
4.3182	3.1799	0.22195	0.0042427
4.8371	3.4416	0.27123	0.0058195
5.593	3.7884	0.3491	0.0086858
6.3489	4.0984	0.43333	0.01227
7.1048	4.3754	0.52305	0.016611
7.8606	4.623	0.61749	0.021741
8.898	4.9209	0.7535	0.030111
9.9354	5.1765	0.8956	0.040049
10.973	5.3958	1.0425	0.05157
12.01	5.5842	1.193	0.064683
13.409	5.7976	1.4001	0.084875

14.808	5.9719	1.6102	0.10788
16.207	6.114	1.8221	0.1336
17.606	6.2305	2.0342	0.16195
19.449	6.354	2.3126	0.20313
21.292	6.4498	2.5884	0.24836
23.135	6.5237	2.8606	0.29731
24.978	6.5818	3.1282	0.34969
27.144	6.6363	3.4358	0.41523
29.31	6.6783	3.7358	0.48457
31.476	6.7107	4.028	0.55723
33.641	6.7366	4.3121	0.63278
36.323	6.7635	4.6524	0.72974
39.005	6.7851	4.9805	0.82976
41.687	6.8024	5.2968	0.93218
44.369	6.8173	5.6015	1.0364
47.786	6.8349	5.9734	1.171
51.202	6.8502	6.328	1.3067
54.618	6.8633	6.6664	1.4427
58.035	6.8755	6.9894	1.5782
62.594	6.8916	7.3974	1.7575
67.154	6.9062	7.7811	1.9339
71.713	6.9191	8.1422	2.1066

76.273	6.9312	8.4822	2.2747
82.502	6.9483	8.9147	2.4962
88.731	6.9633	9.3136	2.7075
94.96	6.9753	9.6822	2.9082
101.19	6.9868	10.023	3.0981
108.44	7.0065	10.385	3.3056
115.7	7.0203	10.716	3.4986
122.95	7.0221	11.022	3.6775
130.2	7.0273	11.3	3.8432
134.57	7.0378	11.454	3.9369
138.93	7.0455	11.6	4.0262
143.29	7.0494	11.739	4.1111
147.66	7.0531	11.871	4.1919
152.02	7.0591	11.996	4.2689
156.38	7.0641	12.114	4.3422
160.74	7.0678	12.227	4.4118
165.11	7.0714	12.333	4.478
170.97	7.0774	12.467	4.5619
176.84	7.0824	12.592	4.6402
182.7	7.0854	12.709	4.7133
188.56	7.0886	12.818	4.7814
195.7	7.0978	12.938	4.8583

202.83	7.1031	13.05	4.9289
209.96	7.1002	13.154	4.9936
217.09	7.1001	13.248	5.053
221.72	7.1062	13.304	5.089
226.35	7.1099	13.357	5.1231
230.97	7.1102	13.408	5.1552
235.6	7.1108	13.457	5.1856
240.22	7.114	13.502	5.2144
244.85	7.1163	13.544	5.2417
249.48	7.1171	13.585	5.2674
254.1	7.118	13.623	5.2917
259.99	7.1211	13.668	5.3208
265.88	7.1232	13.711	5.348
271.77	7.1231	13.751	5.3731
277.66	7.1236	13.788	5.3966
284.5	7.1298	13.827	5.422
291.34	7.1325	13.863	5.4453
298.18	7.1273	13.898	5.4665
305.01	7.1249	13.929	5.4861
309.7	7.1297	13.948	5.4988
314.39	7.1322	13.967	5.5108
319.08	7.1312	13.985	5.522

323.77	7.1305	14.001	5.5326
328.46	7.1327	14.017	5.5427
333.15	7.134	14.032	5.5522
337.84	7.1338	14.046	5.5611
342.53	7.1338	14.059	5.5696
348.37	7.1359	14.074	5.5795
354.2	7.1369	14.089	5.5887
360.04	7.1359	14.102	5.5973
365.87	7.1354	14.115	5.6052
372.57	7.1404	14.127	5.6139
379.28	7.1421	14.139	5.6217
385.98	7.1367	14.152	5.6288
392.69	7.1338	14.163	5.6354
397.46	7.138	14.169	5.6399
402.22	7.1399	14.176	5.6442
406.99	7.1384	14.182	5.648
411.76	7.1372	14.188	5.6517
416.53	7.1392	14.193	5.6553
421.3	7.1402	14.198	5.6586
426.06	7.1395	14.203	5.6617
430.83	7.1391	14.208	5.6647
436.64	7.1409	14.213	5.6681



442.45	7.1417	14.218	5.6712
448.26	7.1402	14.223	5.6741
454.07	7.1394	14.227	5.6768
460.65	7.1439	14.231	5.6798
467.23	7.1454	14.235	5.6825
473.82	7.14	14.24	5.6848
480.4	7.1369	14.244	5.687
486.37	7.1457	14.245	5.6891
492.35	7.1488	14.247	5.6909
498.32	7.1397	14.252	5.6924
504.3	7.1341	14.256	5.6937
509.12	7.1409	14.256	5.6951
513.94	7.1439	14.257	5.6962
518.77	7.1407	14.259	5.6972
523.59	7.1383	14.261	5.6981
528.07	7.141	14.262	5.699
532.55	7.1423	14.263	5.6998
537.04	7.1415	14.264	5.7006
541.52	7.1409	14.266	5.7013
546.76	7.1424	14.267	5.7021
552.01	7.143	14.268	5.7029
557.25	7.142	14.269	5.7036

562.49	7.1413	14.27	5.7042
568.86	7.1439	14.271	5.705
575.23	7.1448	14.272	5.7057
581.6	7.1417	14.273	5.7063
587.97	7.14	14.275	5.7068
594.44	7.1472	14.274	5.7076
600.92	7.1494	14.274	5.7082
607.39	7.1406	14.277	5.7084
613.87	7.1355	14.279	5.7087
619.21	7.1443	14.277	5.7093
624.54	7.1477	14.277	5.7097
629.88	7.141	14.279	5.7098
635.22	7.1365	14.281	5.71
639.69	7.141	14.28	5.7103
644.17	7.143	14.28	5.7106
648.64	7.1417	14.28	5.7107
653.12	7.1406	14.281	5.7109
657.86	7.1424	14.281	5.7111
662.59	7.1431	14.281	5.7113
667.33	7.1424	14.281	5.7115
672.07	7.1418	14.282	5.7116
677.93	7.1434	14.282	5.7118

683.79	7.144	14.282	5.712
689.64	7.1424	14.282	5.7121
695.5	7.1414	14.283	5.7122
702.17	7.146	14.282	5.7125
708.83	7.1474	14.282	5.7127
715.5	7.1414	14.284	5.7127
722.17	7.1381	14.285	5.7127
726.93	7.1421	14.284	5.7129
731.69	7.1439	14.283	5.713
736.45	7.142	14.284	5.713
741.22	7.1407	14.284	5.7131
745.98	7.1425	14.284	5.7132
750.74	7.1433	14.284	5.7133
755.5	7.1425	14.284	5.7133
760.26	7.1419	14.284	5.7133
766.07	7.1435	14.284	5.7135
771.87	7.1441	14.284	5.7135
777.67	7.1425	14.285	5.7135
783.47	7.1414	14.285	5.7136
790.05	7.1458	14.284	5.7137
796.63	7.1471	14.284	5.7138
803.21	7.1416	14.285	5.7137

809.8	7.1385	14.286	5.7137
815.78	7.1472	14.284	5.7139
821.76	7.1501	14.283	5.714
827.74	7.1409	14.286	5.7138
833.73	7.1352	14.287	5.7137
838.56	7.142	14.285	5.7139
843.38	7.1449	14.285	5.714
848.21	7.1416	14.286	5.7139
853.04	7.1391	14.286	5.7139
857.52	7.1418	14.286	5.714
862	7.1431	14.285	5.714
866.49	7.1423	14.285	5.714
870.97	7.1416	14.286	5.714
876.2	7.143	14.285	5.7141
881.44	7.1436	14.285	5.7141
886.67	7.1426	14.285	5.7141
891.91	7.1419	14.286	5.7141
898.27	7.1444	14.285	5.7142
904.63	7.1452	14.285	5.7142
911	7.1422	14.286	5.7141
917.36	7.1404	14.286	5.7141
923.84	7.1476	14.284	5.7143

930.32	7.1497	14.284	5.7143
936.8	7.1409	14.286	5.7141
943.28	7.1358	14.287	5.714
948.63	7.1446	14.285	5.7142
953.97	7.148	14.284	5.7143
959.32	7.1413	14.286	5.7142
964.67	7.1367	14.287	5.7141
969.14	7.1412	14.286	5.7142
973.62	7.1432	14.286	5.7142
978.1	7.1419	14.286	5.7142
982.57	7.1408	14.286	5.7142
987.3	7.1425	14.286	5.7142
992.04	7.1433	14.286	5.7142
996.77	7.1425	14.286	5.7142
1001.5	7.142	14.286	5.7142
1007.4	7.1436	14.285	5.7143
1013.2	7.1441	14.285	5.7143
1019	7.1425	14.286	5.7142
1024.9	7.1415	14.286	5.7142
1031.6	7.1461	14.285	5.7143
1038.2	7.1474	14.285	5.7144
1044.9	7.1415	14.286	5.7142

1051.6	7.1382	14.287	5.7141
1056.3	7.1422	14.286	5.7142
1061.1	7.1439	14.285	5.7143
1065.9	7.1421	14.286	5.7142
1070.6	7.1407	14.286	5.7142
1075.4	7.1426	14.286	5.7143
1080.2	7.1433	14.286	5.7143
1084.9	7.1425	14.286	5.7143
1089.7	7.1419	14.286	5.7142
1095.5	7.1436	14.286	5.7143
1101.3	7.1441	14.285	5.7143
1107.1	7.1425	14.286	5.7143
1112.9	7.1415	14.286	5.7142
1119.5	7.1458	14.285	5.7143
1126.1	7.1471	14.285	5.7144
1132.6	7.1416	14.286	5.7142
1139.2	7.1385	14.287	5.7142
1145.2	7.1472	14.285	5.7144
1151.2	7.1501	14.284	5.7145
1157.1	7.1409	14.286	5.7142
1163.1	7.1353	14.287	5.7141
1167.9	7.142	14.286	5.7143

1172.8	7.1449	14.285	5.7143
1177.6	7.1416	14.286	5.7142
1182.4	7.1392	14.287	5.7142
1186.8	7.1417	14.286	5.7143
1191.2	7.1429	14.286	5.7143
1195.6	7.1423	14.286	5.7143
1200	7.1417	14.286	5.7143

