

PLOTTING OF CURVES AND SURFACES

Making 3D surface plots, contour plots, and gradient plots in Matlab is slightly more complicated than making simple line graphs, but we will present some examples that, with simple modifications, should enable you to create most of the pictures that you will need.

Matlab provides a variety of functions for displaying data as 2-D or 3-D graphics for 2-D graphics; the command plots vector x_1 versus vector y_1 , vector x_2 versus vector y_2 , etc. on the same graph. Other commands for 2-D graphics are: polar, bar, stairs, loglog, semilogx and semilogy.

For 3-D graphics, the most commonly used commands are:

```
plot3(x1,y1,z1,'linestyle', x1,y1,z1,'linestyle',.....)
```

```
contour(x,y,z),mesh(x,y,z),surf(x,y,z)
```

The first statement is a 3-D analogue of plot() and plots lines and points in 3-D. the second statement produces contour plots of the matrix z using the vectors x and y to control the scaling on the x - and y - axes. For surface or meshplots, you use the third statement where x , y are vectors or matrices and z is a matrix. Other commands available for 3-D graphics are: pcolor, image, contour3, fill3, cylinder, and sphere.

Mathematical form:

Importance visualizing curves and surfaces

- Draw the curve for the given function $f(x)$
- Draw the surface for the given function.

MATLAB Syntax used:

Command	Description
plot(y)	Plots the columns of Y versus the index of each value when Y is a real number. For complex Y, plot(Y) is equivalent to plot(real(Y),imag(Y))
plot3(X1,Y1,Z1)	Displays a three-dimensional plot of a set of data points
surf(Z)	Creates a three-dimensional shaded surface from the z components in matrix Z, using $x = 1:n$ and $y = 1:m$, where $[m,n] = \text{size}(Z)$
ezsurf(fun)	Creates a graph of fun(x,y) using the surf function. fun is plotted over the default domain: $-2\pi < x < 2\pi$, $-2\pi < y < 2\pi$.
y = linspace(a,b,n)	Generates a row vector y of n points linearly spaced between and including a and b.
mesh(X,Y,Z)	Draws a wireframe mesh with color determined by Z so color is proportional to surface height
[X,Y] = meshgrid(x,y)	Transforms the domain specified by vectors x and y into arrays X and Y, which can be used to evaluate functions of two variables and three-dimensional mesh/surface plots.
subplot(m,n,p)	Breaks the figure window into an m-by-n matrix of small axes, selects the pth axes object for the current plot, and returns the axes handle.
colormap(map)	Sets the colormap to the matrix map. If any values in map are outside the interval [0 1], you receive the error Colormap must have values in [0, 1].
Prism	Repeats the six colors red, orange, yellow, green, blue, and violet
Flag	Consists of the colors red, white, blue, and black. This colormap completely changes color with each index increment
hsv.	Varies the hue component of the hue-saturation-value color model. The colors begin with red, pass through yellow, green, cyan, blue, magenta, and return to red.
shading flat	Controls the color shading of surface and patch graphics objects.

Example 1:

Draw a circle with centre (1, 3)

MATLAB Code:

```
clc
```

```
clear all
```

```
t = linspace(0,  
2*pi,101);
```

```
t =
```

Columns 1 through 20

	0	0.0628	0.1257	0.1885	0.2513	0.3142	0.3770	0.4398
0.5027	0.5655	0.6283	0.6912	0.7540	0.8168	0.8796	0.9425	
1.0053	1.0681	1.1310	1.1938					

Columns 21 through 40

	1.2566	1.3195	1.3823	1.4451	1.5080	1.5708	1.6336	1.6965
1.7593	1.8221	1.8850	1.9478	2.0106	2.0735	2.1363	2.1991	
2.2619	2.3248	2.3876	2.4504					

Columns 41 through 60

	2.5133	2.5761	2.6389	2.7018	2.7646	2.8274	2.8903	2.9531
3.0159	3.0788	3.1416	3.2044	3.2673	3.3301	3.3929	3.4558	
3.5186	3.5814	3.6442	3.7071					

Columns 61 through 80

	3.7699	3.8327	3.8956	3.9584	4.0212	4.0841	4.1469	4.2097
4.2726	4.3354	4.3982	4.4611	4.5239	4.5867	4.6496	4.7124	
4.7752	4.8381	4.9009	4.9637					

Columns 81 through 100

	5.0265	5.0894	5.1522	5.2150	5.2779	5.3407	5.4035	5.4664
--	--------	--------	--------	--------	--------	--------	--------	--------

5.5292	5.5920	5.6549	5.7177	5.7805	5.8434	5.9062	5.9690
6.0319	6.0947	6.1575	6.2204				

Column 101

6.2832

$x = 1 + 2 \cdot \cos(t);$

x =

Columns 1 through 20

3.0000	2.9961	2.9842	2.9646	2.9372	2.9021	2.8596	2.8097
2.7526	2.6887	2.6180	2.5410	2.4579	2.3691	2.2748	2.1756
2.0717	1.9635	1.8516	1.7362				

Columns 21 through 40

1.6180	1.4974	1.3748	1.2507	1.1256	1.0000	0.8744	0.7493
0.6252	0.5026	0.3820	0.2638	0.1484	0.0365	-0.0717	-0.1756
0.2748	-0.3691	-0.4579	-0.5410				

Columns 41 through 60

-0.6180	-0.6887	-0.7526	-0.8097	-0.8596	-0.9021	-0.9372	-0.9646
-0.9842	-0.9961	-1.0000	-0.9961	-0.9842	-0.9646	-0.9372	-0.9021
0.8596	-0.8097	-0.7526	-0.6887				

Columns 61 through 80

-0.6180	-0.5410	-0.4579	-0.3691	-0.2748	-0.1756	-0.0717	0.0365
0.1484	0.2638	0.3820	0.5026	0.6252	0.7493	0.8744	1.0000
1.1256	1.2507	1.3748	1.4974				

Columns 81 through 100

1.6180	1.7362	1.8516	1.9635	2.0717	2.1756	2.2748	2.3691
2.4579	2.5410	2.6180	2.6887	2.7526	2.8097	2.8596	2.9021
2.9372	2.9646	2.9842	2.9961				

Column 101

3.0000

$y = 3 + 2 \cdot \sin(t);$

y =

Columns 1 through 20

3.0000	3.1256	3.2507	3.3748	3.4974	3.6180	3.7362	3.8516
3.9635	4.0717	4.1756	4.2748	4.3691	4.4579	4.5410	4.6180
4.6887	4.7526	4.8097	4.8596				

Columns 21 through 40

4.9021	4.9372	4.9646	4.9842	4.9961	5.0000	4.9961	4.9842
4.9646	4.9372	4.9021	4.8596	4.8097	4.7526	4.6887	4.6180
4.5410	4.4579	4.3691	4.2748				

Columns 41 through 60

4.1756	4.0717	3.9635	3.8516	3.7362	3.6180	3.4974	3.3748
3.2507	3.1256	3.0000	2.8744	2.7493	2.6252	2.5026	2.3820
2.2638	2.1484	2.0365	1.9283				

Columns 61 through 80

1.8244	1.7252	1.6309	1.5421	1.4590	1.3820	1.3113	1.2474
1.1903	1.1404	1.0979	1.0628	1.0354	1.0158	1.0039	1.0000
1.0039	1.0158	1.0354	1.0628				

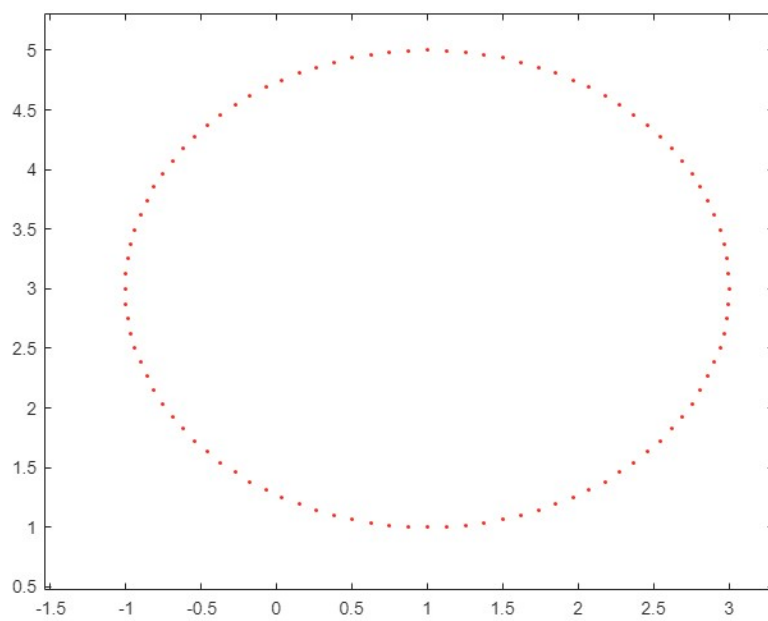
Columns 81 through 100

1.0979	1.1404	1.1903	1.2474	1.3113	1.3820	1.4590	1.5421
1.6309	1.7252	1.8244	1.9283	2.0365	2.1484	2.2638	2.3820
2.5026	2.6252	2.7493	2.8744				

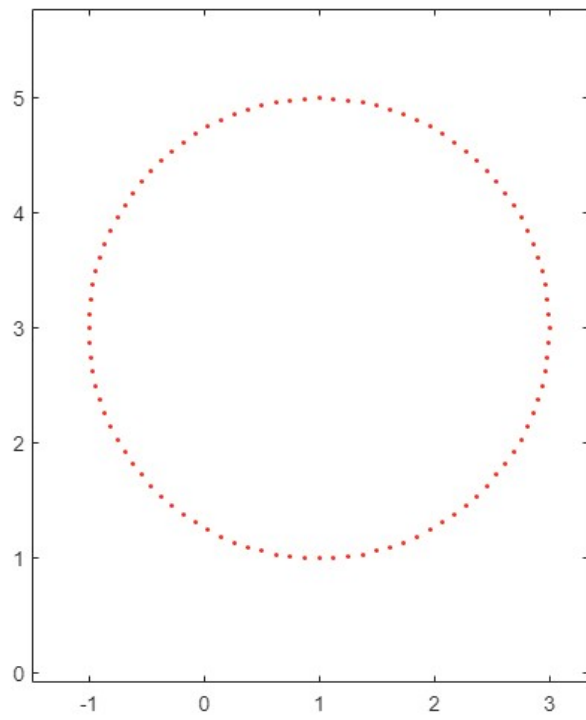
Column 101

3.0000

plot(x,v,'r')



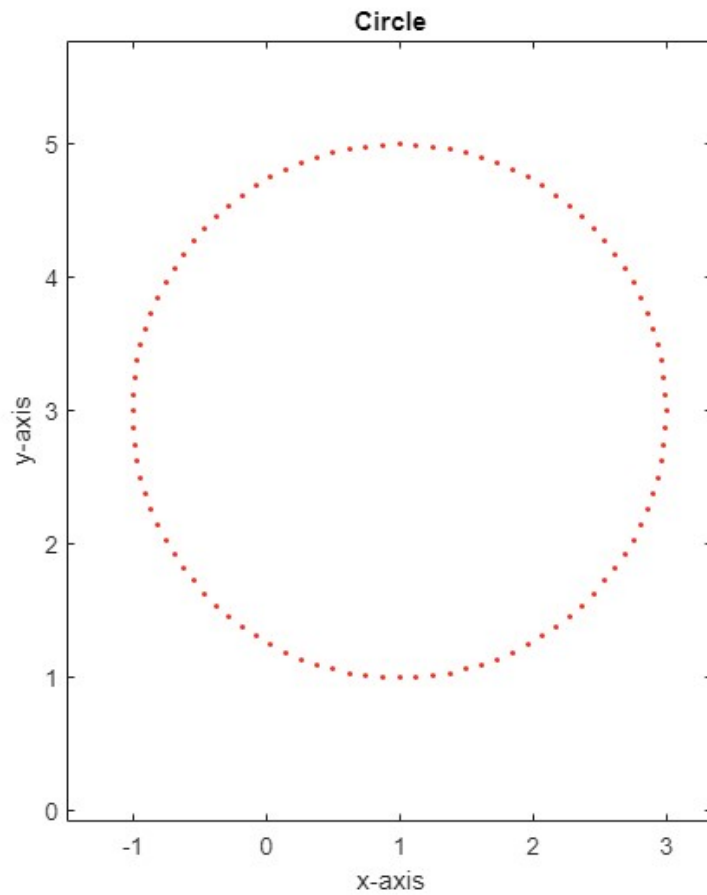
axis equal



xlabel('x-axis')

ylabel('y-axis')

```
title('Circle')
```



Example 2:

Draw the graph by using without hold on function

MATLAB Code:

```
y = linspace(-10,10,1000)
```

```
y =
```

Columns 1 through 33

	10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10									

Columns 34 through 66

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 67 through 99

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 100 through 132

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 133 through 165

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 166 through 198

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 199 through 231

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 232 through 264

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 265 through 297

	10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10									

Columns 298 through 330

	10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10									

Columns 331 through 363

	10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10									

Columns 364 through 396

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 397 through 429

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 430 through 462

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 463 through 495

[illegible]

10 10 10 10 10 10

Columns 496 through 528

10 10 10 10 10 10 10 10 10 10 10 10 10 10
10 10 10 10 10 10 10 10 10 10 10 10 10 10
10 10 10 10 10 10

Columns 529 through 561

10 10 10 10 10 10 10 10 10 10 10 10 10 10
10 10 10 10 10 10 10 10 10 10 10 10 10 10
10 10 10 10 10 10

Columns 562 through 594

10 10 10 10 10 10 10 10 10 10 10 10 10 10
10 10 10 10 10 10 10 10 10 10 10 10 10 10
10 10 10 10 10 10

Columns 595 through 627

10 10 10 10 10 10 10 10 10 10 10 10 10 10
10 10 10 10 10 10 10 10 10 10 10 10 10 10
10 10 10 10 10 10

Columns 628 through 660

10 10 10 10 10 10 10 10 10 10 10 10 10 10
10 10 10 10 10 10 10 10 10 10 10 10 10 10
10 10 10 10 10 10

Columns 661 through 693

10 10 10 10 10 10 10 10 10 10 10 10 10 10
10 10 10 10 10 10 10 10 10 10 10 10 10 10
10 10 10 10 10 10

Columns 694 through 726

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 727 through 759

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 760 through 792

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 793 through 825

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 826 through 858

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 859 through 891

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 892 through 924

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 925 through 957

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

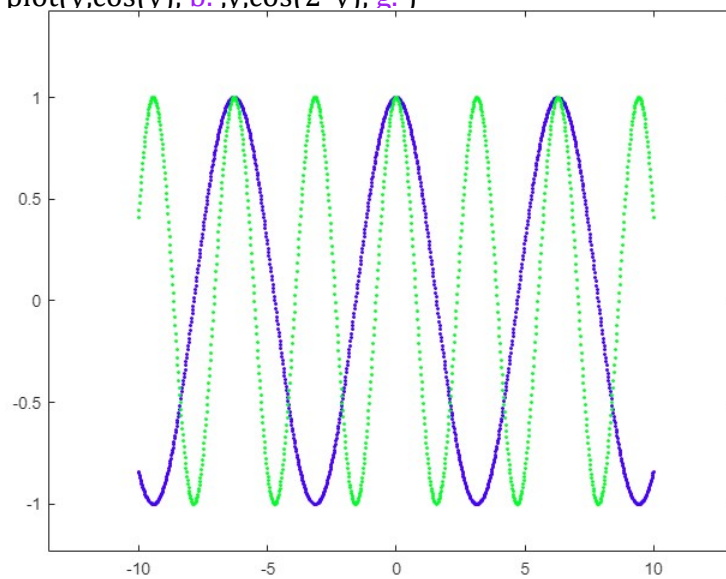
Columns 958 through 990

	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10								

Columns 991 through 1,000

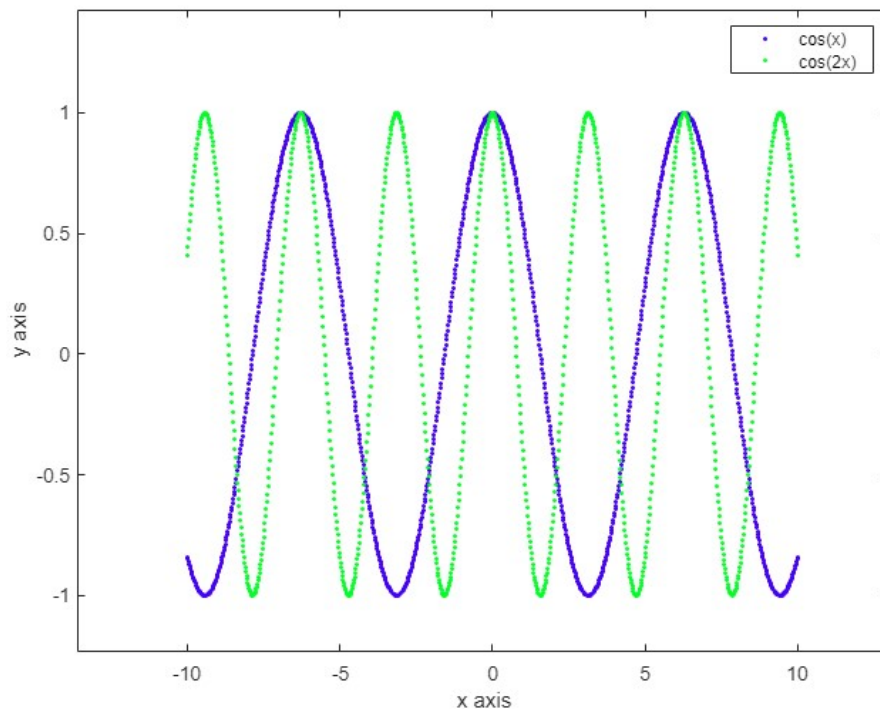
10	10	10	10	10	10	10	10	10	10				
----	----	----	----	----	----	----	----	----	----	--	--	--	--

```
plot(v,cos(v),'b.',v,cos(2*v),'g.')
```



```
xlabel('x axis')  
ylabel('y axis')
```

```
legend('cos(x)','cos(2x)','location','northeast')
)
```



Example 3:

Draw the surface by using plot3

MATLAB Code:

```
t=linspace(0,2*pi,500);
```

```
t =
```

Columns 1 through 20

	0	0.0126	0.0252	0.0378	0.0504	0.0630	0.0755	0.0881
0.1007	0.1133	0.1259	0.1385	0.1511	0.1637	0.1763	0.1889	
0.2015	0.2141	0.2266	0.2392					

Columns 21 through 40

	0.2518	0.2644	0.2770	0.2896	0.3022	0.3148	0.3274	0.3400
0.3526	0.3652	0.3777	0.3903	0.4029	0.4155	0.4281	0.4407	
0.4533	0.4659	0.4785	0.4911					

Columns 41 through 60

0.5037	0.5163	0.5288	0.5414	0.5540	0.5666	0.5792	0.5918
0.6044	0.6170	0.6296	0.6422	0.6548	0.6674	0.6799	0.6925
0.7051	0.7177	0.7303	0.7429				

Columns 61 through 80

0.7555	0.7681	0.7807	0.7933	0.8059	0.8185	0.8310	0.8436
0.8562	0.8688	0.8814	0.8940	0.9066	0.9192	0.9318	0.9444
0.9570	0.9695	0.9821	0.9947				

Columns 81 through 100

1.0073	1.0199	1.0325	1.0451	1.0577	1.0703	1.0829	1.0955
1.1081	1.1206	1.1332	1.1458	1.1584	1.1710	1.1836	1.1962
1.2088	1.2214	1.2340	1.2466				

Columns 101 through 120

1.2592	1.2717	1.2843	1.2969	1.3095	1.3221	1.3347	1.3473
1.3599	1.3725	1.3851	1.3977	1.4103	1.4228	1.4354	1.4480
1.4606	1.4732	1.4858	1.4984				

Columns 121 through 140

1.5110	1.5236	1.5362	1.5488	1.5614	1.5739	1.5865	1.5991
1.6117	1.6243	1.6369	1.6495	1.6621	1.6747	1.6873	1.6999
1.7125	1.7250	1.7376	1.7502				

Columns 141 through 160

1.7628	1.7754	1.7880	1.8006	1.8132	1.8258	1.8384	1.8510
1.8635	1.8761	1.8887	1.9013	1.9139	1.9265	1.9391	1.9517
1.9643	1.9769	1.9895	2.0021				

Columns 161 through 180

2.0146	2.0272	2.0398	2.0524	2.0650	2.0776	2.0902	2.1028
2.1154	2.1280	2.1406	2.1532	2.1657	2.1783	2.1909	2.2035

2.2161 2.2287 2.2413 2.2539

Columns 181 through 200

2.2665 2.2791 2.2917 2.3043 2.3168 2.3294 2.3420 2.3546
2.3672 2.3798 2.3924 2.4050 2.4176 2.4302 2.4428 2.4554
2.4679 2.4805 2.4931 2.5057

Columns 201 through 220

2.5183 2.5309 2.5435 2.5561 2.5687 2.5813 2.5939 2.6065
2.6190 2.6316 2.6442 2.6568 2.6694 2.6820 2.6946 2.7072
2.7198 2.7324 2.7450 2.7576

Columns 221 through 240

2.7701 2.7827 2.7953 2.8079 2.8205 2.8331 2.8457 2.8583
2.8709 2.8835 2.8961 2.9086 2.9212 2.9338 2.9464 2.9590
2.9716 2.9842 2.9968 3.0094

Columns 241 through 260

3.0220 3.0346 3.0472 3.0597 3.0723 3.0849 3.0975 3.1101
3.1227 3.1353 3.1479 3.1605 3.1731 3.1857 3.1983 3.2108
3.2234 3.2360 3.2486 3.2612

Columns 261 through 280

3.2738 3.2864 3.2990 3.3116 3.3242 3.3368 3.3494 3.3619
3.3745 3.3871 3.3997 3.4123 3.4249 3.4375 3.4501 3.4627
3.4753 3.4879 3.5005 3.5130

Columns 281 through 300

3.5256 3.5382 3.5508 3.5634 3.5760 3.5886 3.6012 3.6138
3.6264 3.6390 3.6516 3.6641 3.6767 3.6893 3.7019 3.7145
3.7271 3.7397 3.7523 3.7649

Columns 301 through 320

3.7775	3.7901	3.8026	3.8152	3.8278	3.8404	3.8530	3.8656
3.8782	3.8908	3.9034	3.9160	3.9286	3.9412	3.9537	3.9663
3.9789	3.9915	4.0041	4.0167				

Columns 321 through 340

4.0293	4.0419	4.0545	4.0671	4.0797	4.0923	4.1048	4.1174
4.1300	4.1426	4.1552	4.1678	4.1804	4.1930	4.2056	4.2182
4.2308	4.2434	4.2559	4.2685				

Columns 341 through 360

4.2811	4.2937	4.3063	4.3189	4.3315	4.3441	4.3567	4.3693
4.3819	4.3945	4.4070	4.4196	4.4322	4.4448	4.4574	4.4700
4.4826	4.4952	4.5078	4.5204				

Columns 361 through 380

4.5330	4.5456	4.5581	4.5707	4.5833	4.5959	4.6085	4.6211
4.6337	4.6463	4.6589	4.6715	4.6841	4.6966	4.7092	4.7218
4.7344	4.7470	4.7596	4.7722				

Columns 381 through 400

4.7848	4.7974	4.8100	4.8226	4.8352	4.8477	4.8603	4.8729
4.8855	4.8981	4.9107	4.9233	4.9359	4.9485	4.9611	4.9737
4.9863	4.9988	5.0114	5.0240				

Columns 401 through 420

5.0366	5.0492	5.0618	5.0744	5.0870	5.0996	5.1122	5.1248
5.1374	5.1499	5.1625	5.1751	5.1877	5.2003	5.2129	5.2255
5.2381	5.2507	5.2633	5.2759				

Columns 421 through 440

5.2885	5.3010	5.3136	5.3262	5.3388	5.3514	5.3640	5.3766
5.3892	5.4018	5.4144	5.4270	5.4396	5.4521	5.4647	5.4773
5.4899	5.5025	5.5151	5.5277				

Columns 441 through 460

5.5403	5.5529	5.5655	5.5781	5.5906	5.6032	5.6158	5.6284
5.6410	5.6536	5.6662	5.6788	5.6914	5.7040	5.7166	5.7292
5.7417	5.7543	5.7669	5.7795				

Columns 461 through 480

5.7921	5.8047	5.8173	5.8299	5.8425	5.8551	5.8677	5.8803
5.8928	5.9054	5.9180	5.9306	5.9432	5.9558	5.9684	5.9810
5.9936	6.0062	6.0188	6.0314				

Columns 481 through 500

6.0439	6.0565	6.0691	6.0817	6.0943	6.1069	6.1195	6.1321
6.1447	6.1573	6.1699	6.1825	6.1950	6.2076	6.2202	6.2328
6.2454	6.2580	6.2706	6.2832				

$x = \cos(t);$

x =

Columns 1 through 20

1.0000	0.9999	0.9997	0.9993	0.9987	0.9980	0.9971	0.9961
0.9949	0.9936	0.9921	0.9904	0.9886	0.9866	0.9845	0.9822
0.9798	0.9772	0.9744	0.9715				

Columns 21 through 40

0.9685	0.9652	0.9619	0.9584	0.9547	0.9509	0.9469	0.9428
0.9385	0.9341	0.9295	0.9248	0.9199	0.9149	0.9098	0.9045
0.8990	0.8934	0.8877	0.8818				

Columns 41 through 60

0.8758	0.8697	0.8634	0.8570	0.8504	0.8437	0.8369	0.8299
0.8228	0.8156	0.8083	0.8008	0.7932	0.7855	0.7776	0.7696
0.7615	0.7533	0.7450	0.7365				

Columns 61 through 80

0.7279	0.7192	0.7104	0.7015	0.6925	0.6834	0.6741	0.6648
0.6553	0.6457	0.6361	0.6263	0.6164	0.6065	0.5964	0.5863
0.5760	0.5657	0.5552	0.5447				

Columns 81 through 100

0.5341	0.5234	0.5127	0.5018	0.4909	0.4799	0.4688	0.4576
0.4464	0.4351	0.4237	0.4123	0.4008	0.3892	0.3776	0.3659
0.3542	0.3423	0.3305	0.3186				

Columns 101 through 120

0.3066	0.2946	0.2826	0.2705	0.2583	0.2461	0.2339	0.2216
0.2093	0.1970	0.1847	0.1723	0.1599	0.1474	0.1349	0.1225
0.1100	0.0974	0.0849	0.0723				

Columns 121 through 140

0.0598	0.0472	0.0346	0.0220	0.0094	-0.0031	-0.0157	-0.0283
-0.0409	-0.0535	-0.0661	-0.0786	-0.0912	-0.1037	-0.1162	-0.1287
-							
0.1412	-0.1536	-0.1661	-0.1785				

Columns 141 through 160

-0.1908	-0.2032	-0.2155	-0.2278	-0.2400	-0.2522	-0.2644	-0.2765
-0.2886	-0.3006	-0.3126	-0.3245	-0.3364	-0.3483	-0.3600	-0.3718
-							
0.3834	-0.3950	-0.4065	-0.4180				

Columns 161 through 180

-0.4294	-0.4408	-0.4520	-0.4632	-0.4743	-0.4854	-0.4964	-0.5073
-0.5181	-0.5288	-0.5394	-0.5500	-0.5605	-0.5709	-0.5811	-0.5913
-							
0.6015	-0.6115	-0.6214	-0.6312				

Columns 181 through 200

-0.6409	-0.6505	-0.6600	-0.6694	-0.6787	-0.6879	-0.6970	-0.7060
---------	---------	---------	---------	---------	---------	---------	---------

-0.7149	-0.7236	-0.7322	-0.7408	-0.7492	-0.7574	-0.7656	-0.7736	-
0.7816	-0.7893	-0.7970	-0.8046					

Columns 201 through 220

-0.8120	-0.8193	-0.8264	-0.8334	-0.8403	-0.8471	-0.8537	-0.8602	
-0.8665	-0.8728	-0.8788	-0.8848	-0.8906	-0.8962	-0.9017	-0.9071	-
0.9123	-0.9174	-0.9224	-0.9272					

Columns 221 through 240

-0.9318	-0.9363	-0.9406	-0.9448	-0.9489	-0.9528	-0.9565	-0.9601	
-0.9636	-0.9669	-0.9700	-0.9730	-0.9758	-0.9785	-0.9810	-0.9834	-
0.9856	-0.9876	-0.9895	-0.9913					

Columns 241 through 260

-0.9929	-0.9943	-0.9955	-0.9967	-0.9976	-0.9984	-0.9990	-0.9995	
-0.9998	-1.0000	-1.0000	-0.9998	-0.9995	-0.9990	-0.9984	-0.9976	-
0.9967	-0.9955	-0.9943	-0.9929					

Columns 261 through 280

-0.9913	-0.9895	-0.9876	-0.9856	-0.9834	-0.9810	-0.9785	-0.9758	
-0.9730	-0.9700	-0.9669	-0.9636	-0.9601	-0.9565	-0.9528	-0.9489	-
0.9448	-0.9406	-0.9363	-0.9318					

Columns 281 through 300

-0.9272	-0.9224	-0.9174	-0.9123	-0.9071	-0.9017	-0.8962	-0.8906	
-0.8848	-0.8788	-0.8728	-0.8665	-0.8602	-0.8537	-0.8471	-0.8403	-
0.8334	-0.8264	-0.8193	-0.8120					

Columns 301 through 320

-0.8046	-0.7970	-0.7893	-0.7816	-0.7736	-0.7656	-0.7574	-0.7492	
-0.7408	-0.7322	-0.7236	-0.7149	-0.7060	-0.6970	-0.6879	-0.6787	-
0.6694	-0.6600	-0.6505	-0.6409					

Columns 321 through 340

-0.6312	-0.6214	-0.6115	-0.6015	-0.5913	-0.5811	-0.5709	-0.5605
-0.5500	-0.5394	-0.5288	-0.5181	-0.5073	-0.4964	-0.4854	-0.4743
-0.4632	-0.4520	-0.4408	-0.4294				

Columns 341 through 360

-0.4180	-0.4065	-0.3950	-0.3834	-0.3718	-0.3600	-0.3483	-0.3364
-0.3245	-0.3126	-0.3006	-0.2886	-0.2765	-0.2644	-0.2522	-0.2400
-0.2278	-0.2155	-0.2032	-0.1908				

Columns 361 through 380

-0.1785	-0.1661	-0.1536	-0.1412	-0.1287	-0.1162	-0.1037	-0.0912
-0.0786	-0.0661	-0.0535	-0.0409	-0.0283	-0.0157	-0.0031	0.0094
0.0220	0.0346	0.0472	0.0598				

Columns 381 through 400

0.0723	0.0849	0.0974	0.1100	0.1225	0.1349	0.1474	0.1599
0.1723	0.1847	0.1970	0.2093	0.2216	0.2339	0.2461	0.2583
0.2705	0.2826	0.2946	0.3066				

Columns 401 through 420

0.3186	0.3305	0.3423	0.3542	0.3659	0.3776	0.3892	0.4008
0.4123	0.4237	0.4351	0.4464	0.4576	0.4688	0.4799	0.4909
0.5018	0.5127	0.5234	0.5341				

Columns 421 through 440

0.5447	0.5552	0.5657	0.5760	0.5863	0.5964	0.6065	0.6164
0.6263	0.6361	0.6457	0.6553	0.6648	0.6741	0.6834	0.6925
0.7015	0.7104	0.7192	0.7279				

Columns 441 through 460

0.7365	0.7450	0.7533	0.7615	0.7696	0.7776	0.7855	0.7932
0.8008	0.8083	0.8156	0.8228	0.8299	0.8369	0.8437	0.8504
0.8570	0.8634	0.8697	0.8758				

Columns 461 through 480

0.8818	0.8877	0.8934	0.8990	0.9045	0.9098	0.9149	0.9199
0.9248	0.9295	0.9341	0.9385	0.9428	0.9469	0.9509	0.9547
0.9584	0.9619	0.9652	0.9685				

Columns 481 through 500

0.9715	0.9744	0.9772	0.9798	0.9822	0.9845	0.9866	0.9886
0.9904	0.9921	0.9936	0.9949	0.9961	0.9971	0.9980	0.9987
0.9993	0.9997	0.9999	1.0000				

$y = \sin(t);$

y =

Columns 1 through 20

	0	0.0126	0.0252	0.0378	0.0503	0.0629	0.0755	0.0880
0.1006	0.1131	0.1256	0.1381	0.1505	0.1630	0.1754	0.1878	
0.2001	0.2124	0.2247	0.2370					

Columns 21 through 40

0.2492	0.2614	0.2735	0.2856	0.2976	0.3096	0.3216	0.3335
0.3453	0.3571	0.3688	0.3805	0.3921	0.4037	0.4152	0.4266
0.4379	0.4492	0.4604	0.4716				

Columns 41 through 60

0.4826	0.4936	0.5045	0.5154	0.5261	0.5368	0.5474	0.5579
0.5683	0.5786	0.5888	0.5989	0.6090	0.6189	0.6287	0.6385
0.6481	0.6577	0.6671	0.6764				

Columns 61 through 80

0.6856	0.6948	0.7038	0.7126	0.7214	0.7301	0.7386	0.7471
0.7554	0.7636	0.7716	0.7796	0.7874	0.7951	0.8027	0.8101

0.8174 0.8246 0.8317 0.8386

Columns 81 through 100

0.8454 0.8521 0.8586 0.8650 0.8712 0.8773 0.8833 0.8891
0.8948 0.9004 0.9058 0.9111 0.9162 0.9211 0.9260 0.9307
0.9352 0.9396 0.9438 0.9479

Columns 101 through 120

0.9518 0.9556 0.9593 0.9627 0.9661 0.9692 0.9723 0.9751
0.9778 0.9804 0.9828 0.9850 0.9871 0.9891 0.9909 0.9925
0.9939 0.9952 0.9964 0.9974

Columns 121 through 140

0.9982 0.9989 0.9994 0.9998 1.0000 1.0000 0.9999 0.9996
0.9992 0.9986 0.9978 0.9969 0.9958 0.9946 0.9932 0.9917
0.9900 0.9881 0.9861 0.9839

Columns 141 through 160

0.9816 0.9791 0.9765 0.9737 0.9708 0.9677 0.9644 0.9610
0.9575 0.9537 0.9499 0.9459 0.9417 0.9374 0.9329 0.9283
0.9236 0.9187 0.9136 0.9084

Columns 161 through 180

0.9031 0.8976 0.8920 0.8862 0.8803 0.8743 0.8681 0.8618
0.8553 0.8488 0.8420 0.8352 0.8282 0.8211 0.8138 0.8064
0.7989 0.7913 0.7835 0.7756

Columns 181 through 200

0.7676 0.7595 0.7512 0.7429 0.7344 0.7258 0.7171 0.7082
0.6993 0.6902 0.6811 0.6718 0.6624 0.6529 0.6433 0.6336
0.6238 0.6140 0.6040 0.5939

Columns 201 through 220

0.5837	0.5734	0.5631	0.5526	0.5421	0.5315	0.5208	0.5100
0.4991	0.4881	0.4771	0.4660	0.4548	0.4436	0.4323	0.4209
0.4094	0.3979	0.3863	0.3747				

Columns 221 through 240

0.3630	0.3512	0.3394	0.3275	0.3156	0.3036	0.2916	0.2795
0.2674	0.2553	0.2431	0.2308	0.2186	0.2063	0.1939	0.1816
0.1692	0.1567	0.1443	0.1318				

Columns 241 through 260

0.1193	0.1068	0.0943	0.0818	0.0692	0.0566	0.0441	0.0315
0.0189	0.0063	-0.0063	-0.0189	-0.0315	-0.0441	-0.0566	-0.0692
0.0818	-0.0943	-0.1068	-0.1193				

Columns 261 through 280

-0.1318	-0.1443	-0.1567	-0.1692	-0.1816	-0.1939	-0.2063	-0.2186
-0.2308	-0.2431	-0.2553	-0.2674	-0.2795	-0.2916	-0.3036	-0.3156
0.3275	-0.3394	-0.3512	-0.3630				

Columns 281 through 300

-0.3747	-0.3863	-0.3979	-0.4094	-0.4209	-0.4323	-0.4436	-0.4548
-0.4660	-0.4771	-0.4881	-0.4991	-0.5100	-0.5208	-0.5315	-0.5421
0.5526	-0.5631	-0.5734	-0.5837				

Columns 301 through 320

-0.5939	-0.6040	-0.6140	-0.6238	-0.6336	-0.6433	-0.6529	-0.6624
-0.6718	-0.6811	-0.6902	-0.6993	-0.7082	-0.7171	-0.7258	-0.7344
0.7429	-0.7512	-0.7595	-0.7676				

Columns 321 through 340

-0.7756	-0.7835	-0.7913	-0.7989	-0.8064	-0.8138	-0.8211	-0.8282
-0.8352	-0.8420	-0.8488	-0.8553	-0.8618	-0.8681	-0.8743	-0.8803
0.8862	-0.8920	-0.8976	-0.9031				

Columns 341 through 360

-0.9084	-0.9136	-0.9187	-0.9236	-0.9283	-0.9329	-0.9374	-0.9417
-0.9459	-0.9499	-0.9537	-0.9575	-0.9610	-0.9644	-0.9677	-0.9708
-	0.9737	-0.9765	-0.9791	-0.9816			

Columns 361 through 380

-0.9839	-0.9861	-0.9881	-0.9900	-0.9917	-0.9932	-0.9946	-0.9958
-0.9969	-0.9978	-0.9986	-0.9992	-0.9996	-0.9999	-1.0000	-1.0000
-	0.9998	-0.9994	-0.9989	-0.9982			

Columns 381 through 400

-0.9974	-0.9964	-0.9952	-0.9939	-0.9925	-0.9909	-0.9891	-0.9871
-0.9850	-0.9828	-0.9804	-0.9778	-0.9751	-0.9723	-0.9692	-0.9661
-	0.9627	-0.9593	-0.9556	-0.9518			

Columns 401 through 420

-0.9479	-0.9438	-0.9396	-0.9352	-0.9307	-0.9260	-0.9211	-0.9162
-0.9111	-0.9058	-0.9004	-0.8948	-0.8891	-0.8833	-0.8773	-0.8712
-	0.8650	-0.8586	-0.8521	-0.8454			

Columns 421 through 440

-0.8386	-0.8317	-0.8246	-0.8174	-0.8101	-0.8027	-0.7951	-0.7874
-0.7796	-0.7716	-0.7636	-0.7554	-0.7471	-0.7386	-0.7301	-0.7214
-	0.7126	-0.7038	-0.6948	-0.6856			

Columns 441 through 460

-0.6764	-0.6671	-0.6577	-0.6481	-0.6385	-0.6287	-0.6189	-0.6090
-0.5989	-0.5888	-0.5786	-0.5683	-0.5579	-0.5474	-0.5368	-0.5261
-	0.5154	-0.5045	-0.4936	-0.4826			

Columns 461 through 480

-0.4716	-0.4604	-0.4492	-0.4379	-0.4266	-0.4152	-0.4037	-0.3921
-0.3805	-0.3688	-0.3571	-0.3453	-0.3335	-0.3216	-0.3096	-0.2976
-							

0.2856 -0.2735 -0.2614 -0.2492

Columns 481 through 500

-0.2370 -0.2247 -0.2124 -0.2001 -0.1878 -0.1754 -0.1630 -0.1505
-0.1381 -0.1256 -0.1131 -0.1006 -0.0880 -0.0755 -0.0629 -0.0503 -
0.0378 -0.0252 -0.0126 -0.0000

z=sin(5*t);

z =

Columns 1 through 20

0 0.0629 0.1256 0.1878 0.2492 0.3096 0.3688 0.4266
0.4826 0.5368 0.5888 0.6385 0.6856 0.7301 0.7716 0.8101
0.8454 0.8773 0.9058 0.9307

Columns 21 through 40

0.9518 0.9692 0.9828 0.9925 0.9982 1.0000 0.9978 0.9917
0.9816 0.9677 0.9499 0.9283 0.9031 0.8743 0.8420 0.8064
0.7676 0.7258 0.6811 0.6336

Columns 41 through 60

0.5837 0.5315 0.4771 0.4209 0.3630 0.3036 0.2431 0.1816
0.1193 0.0566 -0.0063 -0.0692 -0.1318 -0.1939 -0.2553 -0.3156 -
0.3747 -0.4323 -0.4881 -0.5421

Columns 61 through 80

-0.5939 -0.6433 -0.6902 -0.7344 -0.7756 -0.8138 -0.8488 -0.8803
-0.9084 -0.9329 -0.9537 -0.9708 -0.9839 -0.9932 -0.9986 -1.0000 -
0.9974 -0.9909 -0.9804 -0.9661

Columns 81 through 100

-0.9479 -0.9260 -0.9004 -0.8712 -0.8386 -0.8027 -0.7636 -0.7214

-0.6764	-0.6287	-0.5786	-0.5261	-0.4716	-0.4152	-0.3571	-0.2976	-
0.2370	-0.1754	-0.1131	-0.0503					

Columns 101 through 120

0.0126	0.0755	0.1381	0.2001	0.2614	0.3216	0.3805	0.4379
0.4936	0.5474	0.5989	0.6481	0.6948	0.7386	0.7796	0.8174
0.8521	0.8833	0.9111	0.9352				

Columns 121 through 140

0.9556	0.9723	0.9850	0.9939	0.9989	0.9999	0.9969	0.9900
0.9791	0.9644	0.9459	0.9236	0.8976	0.8681	0.8352	0.7989
0.7595	0.7171	0.6718	0.6238				

Columns 141 through 160

0.5734	0.5208	0.4660	0.4094	0.3512	0.2916	0.2308	0.1692
0.1068	0.0441	-0.0189	-0.0818	-0.1443	-0.2063	-0.2674	-0.3275
-							
0.3863	-0.4436	-0.4991	-0.5526				

Columns 161 through 180

-0.6040	-0.6529	-0.6993	-0.7429	-0.7835	-0.8211	-0.8553	-0.8862
-0.9136	-0.9374	-0.9575	-0.9737	-0.9861	-0.9946	-0.9992	-0.9998
-							
0.9964	-0.9891	-0.9778	-0.9627				

Columns 181 through 200

-0.9438	-0.9211	-0.8948	-0.8650	-0.8317	-0.7951	-0.7554	-0.7126
-0.6671	-0.6189	-0.5683	-0.5154	-0.4604	-0.4037	-0.3453	-0.2856
-							
0.2247	-0.1630	-0.1006	-0.0378				

Columns 201 through 220

0.0252	0.0880	0.1505	0.2124	0.2735	0.3335	0.3921	0.4492
0.5045	0.5579	0.6090	0.6577	0.7038	0.7471	0.7874	0.8246
0.8586	0.8891	0.9162	0.9396				

Columns 221 through 240

0.9593	0.9751	0.9871	0.9952	0.9994	0.9996	0.9958	0.9881
0.9765	0.9610	0.9417	0.9187	0.8920	0.8618	0.8282	0.7913
0.7512	0.7082	0.6624	0.6140				

Columns 241 through 260

0.5631	0.5100	0.4548	0.3979	0.3394	0.2795	0.2186	0.1567
0.0943	0.0315	-0.0315	-0.0943	-0.1567	-0.2186	-0.2795	-0.3394
0.3979	-0.4548	-0.5100	-0.5631				

Columns 261 through 280

-0.6140	-0.6624	-0.7082	-0.7512	-0.7913	-0.8282	-0.8618	-0.8920
-0.9187	-0.9417	-0.9610	-0.9765	-0.9881	-0.9958	-0.9996	-0.9994
0.9952	-0.9871	-0.9751	-0.9593				

Columns 281 through 300

-0.9396	-0.9162	-0.8891	-0.8586	-0.8246	-0.7874	-0.7471	-0.7038
-0.6577	-0.6090	-0.5579	-0.5045	-0.4492	-0.3921	-0.3335	-0.2735
0.2124	-0.1505	-0.0880	-0.0252				

Columns 301 through 320

0.0378	0.1006	0.1630	0.2247	0.2856	0.3453	0.4037	0.4604
0.5154	0.5683	0.6189	0.6671	0.7126	0.7554	0.7951	0.8317
0.8650	0.8948	0.9211	0.9438				

Columns 321 through 340

0.9627	0.9778	0.9891	0.9964	0.9998	0.9992	0.9946	0.9861
0.9737	0.9575	0.9374	0.9136	0.8862	0.8553	0.8211	0.7835
0.7429	0.6993	0.6529	0.6040				

Columns 341 through 360

0.5526	0.4991	0.4436	0.3863	0.3275	0.2674	0.2063	0.1443
0.0818	0.0189	-0.0441	-0.1068	-0.1692	-0.2308	-0.2916	-0.3512
0.4094	-0.4660	-0.5208	-0.5734				

Columns 361 through 380

-0.6238	-0.6718	-0.7171	-0.7595	-0.7989	-0.8352	-0.8681	-0.8976
-0.9236	-0.9459	-0.9644	-0.9791	-0.9900	-0.9969	-0.9999	-0.9989
-	0.9939	-0.9850	-0.9723	-0.9556			

Columns 381 through 400

-0.9352	-0.9111	-0.8833	-0.8521	-0.8174	-0.7796	-0.7386	-0.6948
-0.6481	-0.5989	-0.5474	-0.4936	-0.4379	-0.3805	-0.3216	-0.2614
-	0.2001	-0.1381	-0.0755	-0.0126			

Columns 401 through 420

0.0503	0.1131	0.1754	0.2370	0.2976	0.3571	0.4152	0.4716
0.5261	0.5786	0.6287	0.6764	0.7214	0.7636	0.8027	0.8386
0.8712	0.9004	0.9260	0.9479				

Columns 421 through 440

0.9661	0.9804	0.9909	0.9974	1.0000	0.9986	0.9932	0.9839
0.9708	0.9537	0.9329	0.9084	0.8803	0.8488	0.8138	0.7756
0.7344	0.6902	0.6433	0.5939				

Columns 441 through 460

0.5421	0.4881	0.4323	0.3747	0.3156	0.2553	0.1939	0.1318
0.0692	0.0063	-0.0566	-0.1193	-0.1816	-0.2431	-0.3036	-0.3630
-	0.4209	-0.4771	-0.5315	-0.5837			

Columns 461 through 480

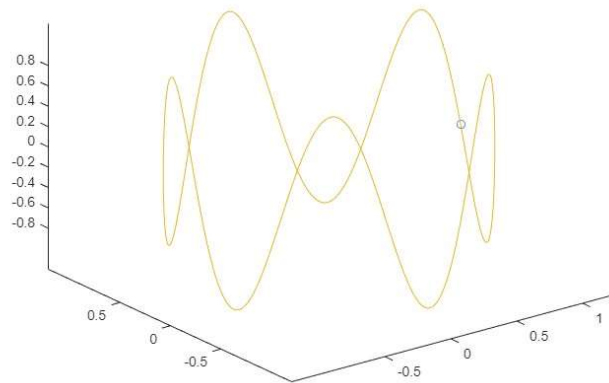
-0.6336	-0.6811	-0.7258	-0.7676	-0.8064	-0.8420	-0.8743	-0.9031
-0.9283	-0.9499	-0.9677	-0.9816	-0.9917	-0.9978	-1.0000	-0.9982
-	0.9925	-0.9828	-0.9692	-0.9518			

Columns 481 through 500

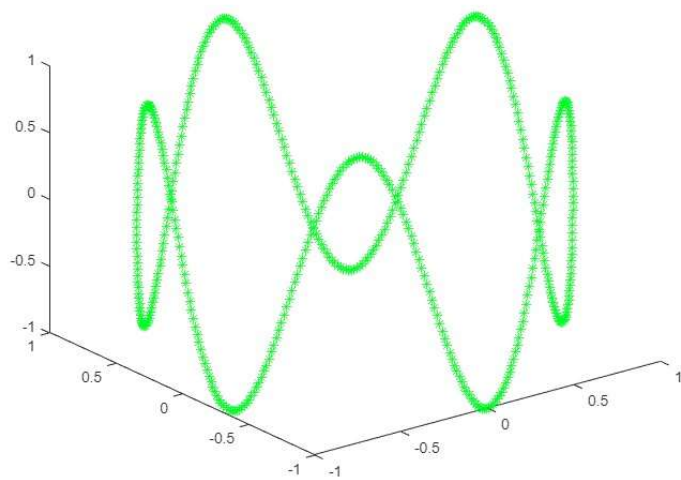
-0.9307	-0.9058	-0.8773	-0.8454	-0.8101	-0.7716	-0.7301	-0.6856
---------	---------	---------	---------	---------	---------	---------	---------

-0.6385	-0.5888	-0.5368	-0.4826	-0.4266	-0.3688	-0.3096	-0.2492	-
0.1878	-0.1256	-0.0629	-0.0000					

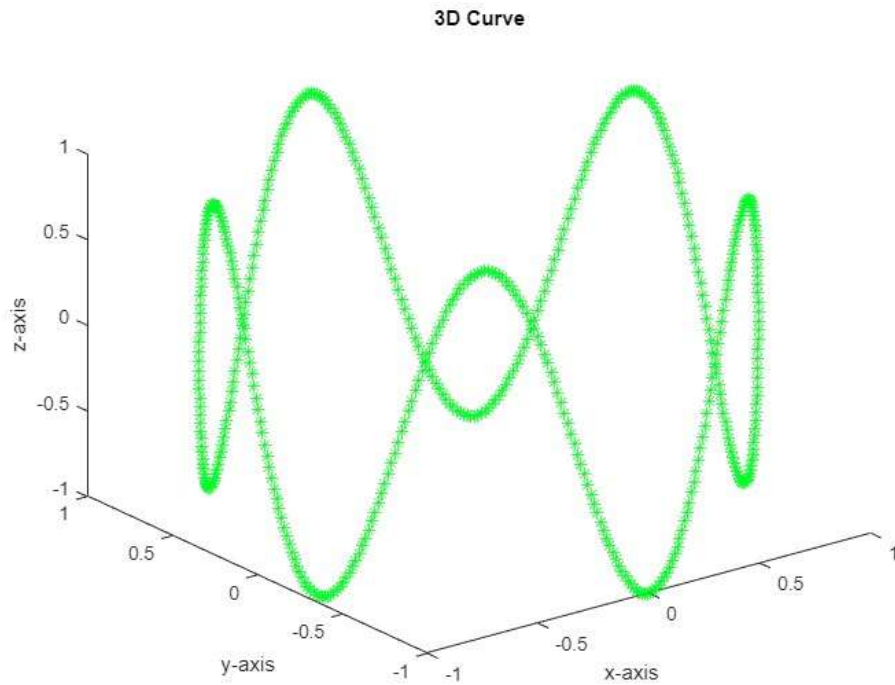
comet3(x,y,z)



plot3(x,y,z,'g*', 'markersize',
7)



```
xlabel('x-axis') ylabel('y-  
axis') zlabel('z-axis')  
title('3D Curve')
```



Example 4:

Draw the four curves $\sin x$, $\cos x$, e^{-x} , $\sin 3x$ in one window

MATLAB Code:

```
clc
```

```
clear all
```

```
x=0:.1:2*pi;
```

```
x =
```

Columns 1 through 20

	0	0.1000	0.2000	0.3000	0.4000	0.5000	0.6000	0.7000
0.8000	0.9000	1.0000	1.1000	1.2000	1.3000	1.4000	1.5000	
1.6000	1.7000	1.8000	1.9000					

Columns 21 through 40

2.0000	2.1000	2.2000	2.3000	2.4000	2.5000	2.6000	2.7000
2.8000	2.9000	3.0000	3.1000	3.2000	3.3000	3.4000	3.5000
3.6000	3.7000	3.8000	3.9000				

Columns 41 through 60

4.0000	4.1000	4.2000	4.3000	4.4000	4.5000	4.6000	4.7000
4.8000	4.9000	5.0000	5.1000	5.2000	5.3000	5.4000	5.5000
5.6000	5.7000	5.8000	5.9000				

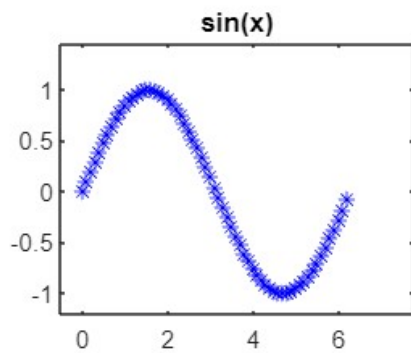
Columns 61 through 63

6.0000	6.1000	6.2000
--------	--------	--------

```
subplot(2,2,1);
```

```
plot(x,sin(x),'b*');
```

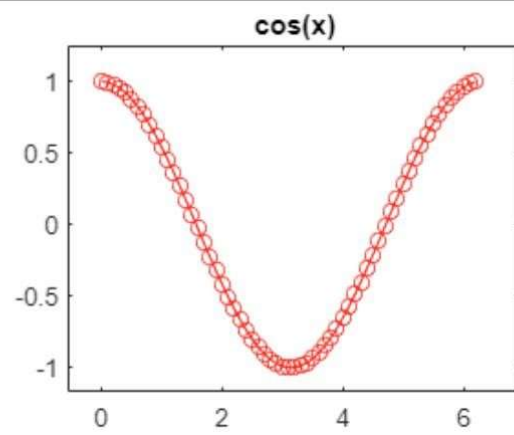
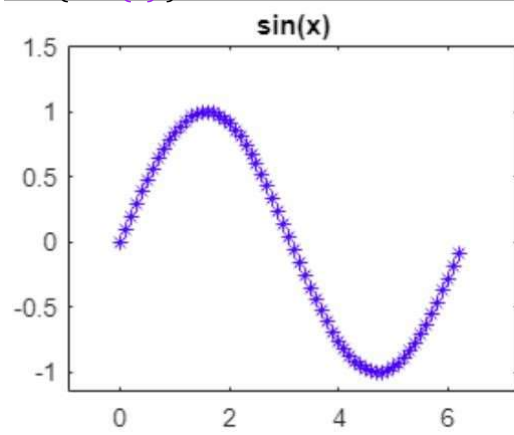
```
title('sin(x)')
```




```
subplot(2,2,2);
```

```
plot(x,cos(x),'r-o');
```

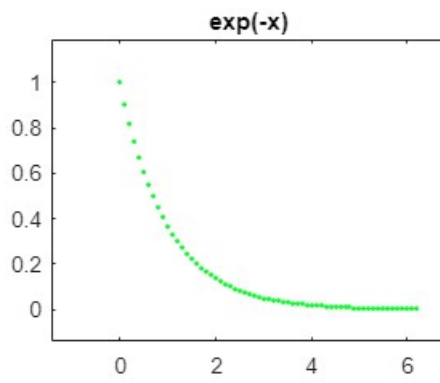
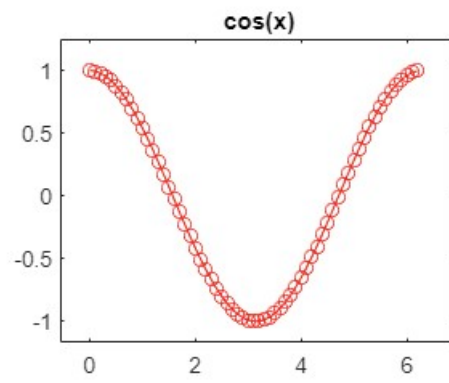
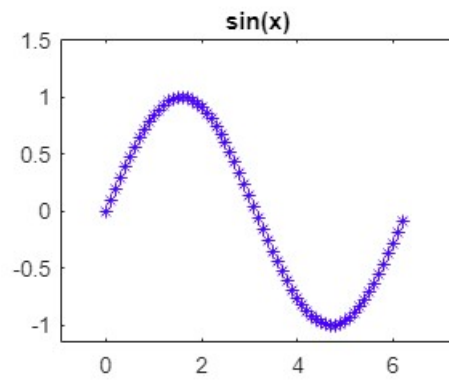
```
title('cos(x)')
```



```
subplot(2,2,3)
```

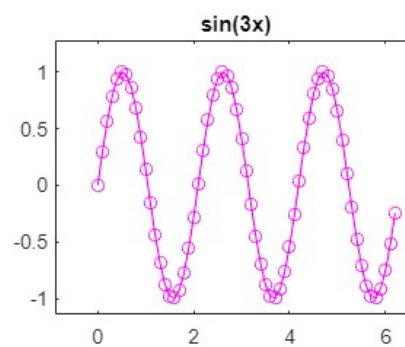
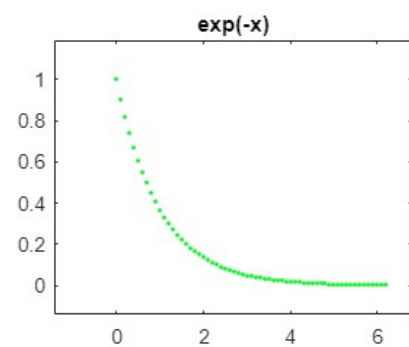
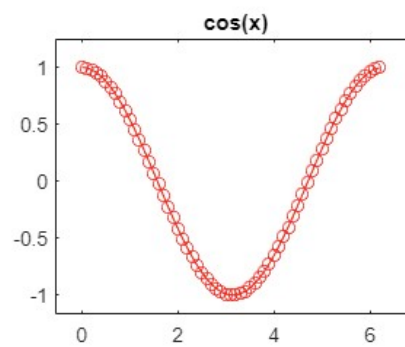
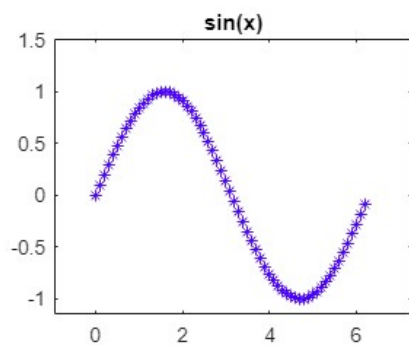
```
plot(x,exp(-x),'g');
```

```
title('exp(-x)')
```



```
subplot(2,2,4);
```

```
plot(x,sin(3*x),'m-  
o'); title('sin(3x)')
```



Example 5:

Draw the surface by using ezsurf and ezplot

MATLAB Code:

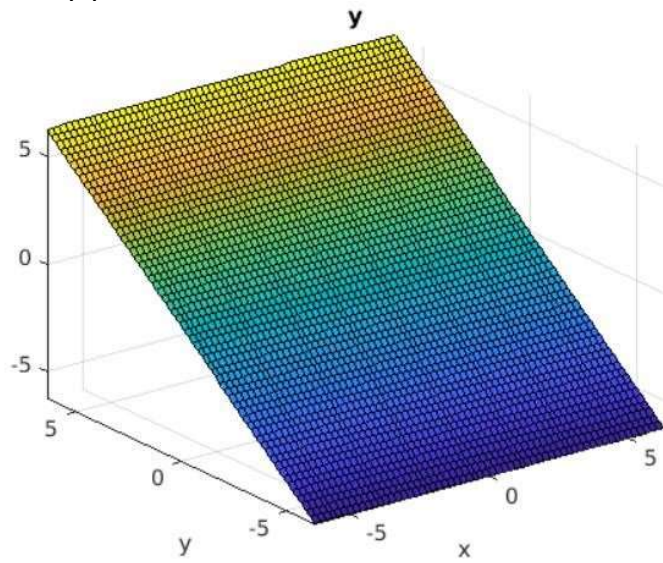
```
syms x y
```

```
f = 2*(x^2+y^2)
```

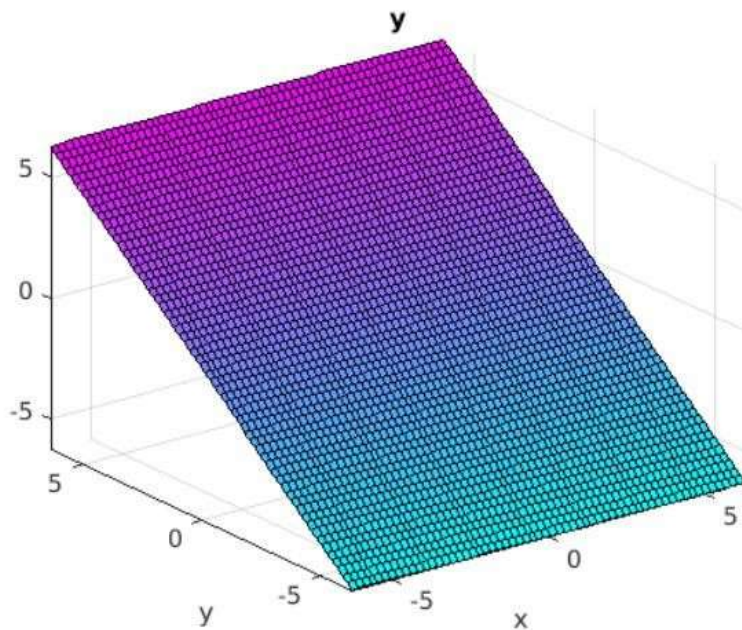
```
f =
```

```
2*x^2 + 2*y^2
```

ezsurf(f)



colormap cool



Example 6:

Draw the ezplot for the function x^2+2x-6

MATLAB Code:

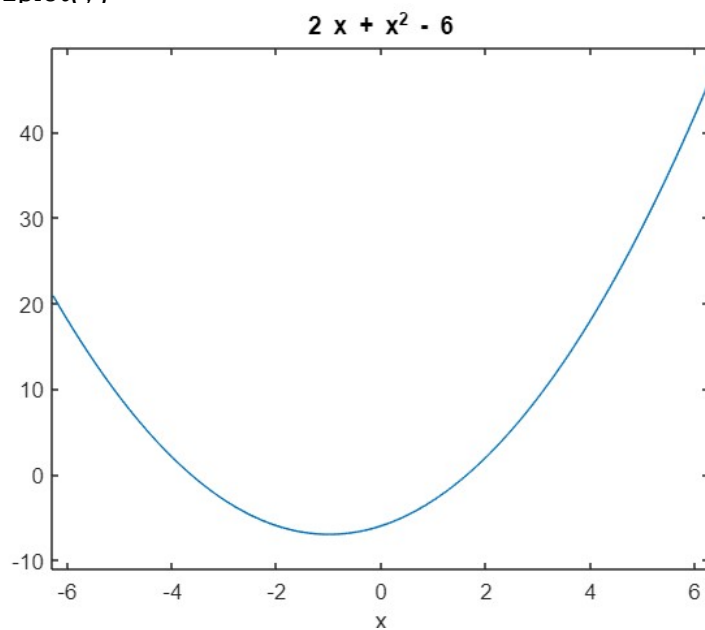
```
syms x
```

```
y = x^2+2*x-6
```

```
y =
```

```
x^2 + 2*x - 6
```

```
ezplot(y)
```



Example 7:

MATLAB Code:

```
x=-1:.05:1;
```

```
x =
```

```
Columns 1 through 20
```

```
-1.0000 -0.9500 -0.9000 -0.8500 -0.8000 -0.7500 -0.7000 -0.6500  
-0.6000 -0.5500 -0.5000 -0.4500 -0.4000 -0.3500 -0.3000 -0.2500 -  
0.2000 -0.1500 -0.1000 -0.0500
```

```
Columns 21 through 40
```

```
0 0.0500 0.1000 0.1500 0.2000 0.2500 0.3000 0.3500
```

0.4000	0.4500	0.5000	0.5500	0.6000	0.6500	0.7000	0.7500
0.8000	0.8500	0.9000	0.9500				

Column 41

1.0000

y=-1:.05:1;

y =

Columns 1 through 20

-1.0000	-0.9500	-0.9000	-0.8500	-0.8000	-0.7500	-0.7000	-0.6500		
-0.6000	-0.5500	-0.5000	-0.4500	-0.4000	-0.3500	-0.3000	-0.2500	-	
0.2000	-0.1500	-0.1000	-0.0500						

Columns 21 through 40

	0	0.0500	0.1000	0.1500	0.2000	0.2500	0.3000	0.3500	
0.4000	0.4500	0.5000	0.5500	0.6000	0.6500	0.7000	0.7500		
0.8000	0.8500	0.9000	0.9500						

Column 41

1.0000

[x,y]=meshgrid(x,y)

x =

Columns 1 through 20

-1.0000	-0.9500	-0.9000	-0.8500	-0.8000	-0.7500	-0.7000	-0.6500		
-0.6000	-0.5500	-0.5000	-0.4500	-0.4000	-0.3500	-0.3000	-0.2500	-	
0.2000	-0.1500	-0.1000	-0.0500						

[illegible]

[illegible]

[illegible]

Columns 21 through 40

[illegible]

[illegible]

[illegible]

	0	0.0500	0.1000	0.1500	0.2000	0.2500	0.3000	0.3500
0.4000	0.4500	0.5000	0.5500	0.6000	0.6500	0.7000	0.7500	
0.8000	0.8500	0.9000	0.9500					
	0	0.0500	0.1000	0.1500	0.2000	0.2500	0.3000	0.3500
0.4000	0.4500	0.5000	0.5500	0.6000	0.6500	0.7000	0.7500	
0.8000	0.8500	0.9000	0.9500					

Column 41

[illegible]

1.0000
1.0000
1.0000
1.0000
1.0000
1.0000
1.0000
1.0000
1.0000
1.0000

y =

Columns 1 through 20

-1.0000	-1.0000	-1.0000	-1.0000	-1.0000	-1.0000	-1.0000	-1.0000	-
-1.0000	-1.0000	-1.0000	-1.0000	-1.0000	-1.0000	-1.0000	-1.0000	-
1.0000	-1.0000	-1.0000	-1.0000					
-0.9500	-0.9500	-0.9500	-0.9500	-0.9500	-0.9500	-0.9500	-0.9500	
-0.9500	-0.9500	-0.9500	-0.9500	-0.9500	-0.9500	-0.9500	-0.9500	-
0.9500	-0.9500	-0.9500	-0.9500					
-0.9000	-0.9000	-0.9000	-0.9000	-0.9000	-0.9000	-0.9000	-0.9000	
-0.9000	-0.9000	-0.9000	-0.9000	-0.9000	-0.9000	-0.9000	-0.9000	-
0.9000	-0.9000	-0.9000	-0.9000					
-0.8500	-0.8500	-0.8500	-0.8500	-0.8500	-0.8500	-0.8500	-0.8500	
-0.8500	-0.8500	-0.8500	-0.8500	-0.8500	-0.8500	-0.8500	-0.8500	-
0.8500	-0.8500	-0.8500	-0.8500					
-0.8000	-0.8000	-0.8000	-0.8000	-0.8000	-0.8000	-0.8000	-0.8000	
-0.8000	-0.8000	-0.8000	-0.8000	-0.8000	-0.8000	-0.8000	-0.8000	-
0.8000	-0.8000	-0.8000	-0.8000					
-0.7500	-0.7500	-0.7500	-0.7500	-0.7500	-0.7500	-0.7500	-0.7500	
-0.7500	-0.7500	-0.7500	-0.7500	-0.7500	-0.7500	-0.7500	-0.7500	-
0.7500	-0.7500	-0.7500	-0.7500					
-0.7000	-0.7000	-0.7000	-0.7000	-0.7000	-0.7000	-0.7000	-0.7000	
-0.7000	-0.7000	-0.7000	-0.7000	-0.7000	-0.7000	-0.7000	-0.7000	-
0.7000	-0.7000	-0.7000	-0.7000					
-0.6500	-0.6500	-0.6500	-0.6500	-0.6500	-0.6500	-0.6500	-0.6500	
-0.6500	-0.6500	-0.6500	-0.6500	-0.6500	-0.6500	-0.6500	-0.6500	-
0.6500	-0.6500	-0.6500	-0.6500					

[illegible]

[illegible]

[illegible]

[illegible]

0.6000	0.6000	0.6000	0.6000				
0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500
0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500
0.6500	0.6500	0.6500	0.6500				
0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000
0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000
0.7000	0.7000	0.7000	0.7000				
0.7500	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500
0.7500	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500
0.7500	0.7500	0.7500	0.7500				
0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
0.8000	0.8000	0.8000	0.8000				
0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500
0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500
0.8500	0.8500	0.8500	0.8500				
0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
0.9000	0.9000	0.9000	0.9000				
0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
0.9500	0.9500	0.9500	0.9500				
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000				

Column 41

-1.0000
 -0.9500
 -0.9000
 -0.8500
 -0.8000
 -0.7500
 -0.7000
 -0.6500
 -0.6000
 -0.5500
 -0.5000
 -0.4500

-0.4000
 -0.3500
 -0.3000
 -0.2500
 -0.2000
 -0.1500
 -0.1000
 -0.0500
 0
 0.0500
 0.1000
 0.1500
 0.2000
 0.2500
 0.3000
 0.3500
 0.4000
 0.4500
 0.5000
 0.5500
 0.6000
 0.6500
 0.7000
 0.7500
 0.8000
 0.8500
 0.9000
 0.9500
 1.0000

$$z=x.*y.^2-x.^3$$

z =

Columns 1 through 20

1.0000	0.8574	0.7290	0.6141	0.5120	0.4219	0.3430	0.2746
0.2160	0.1664	0.1250	0.0911	0.0640	0.0429	0.0270	0.0156

[illegible]

[illegible]

[illegible]

0.0080 0.0034 0.0010 0.0001

Columns 21 through 40

	0	-0.0001	-0.0010	-0.0034	-0.0080	-0.0156	-0.0270	-0.0429	
-0.0640	-0.0911	-0.1250	-0.1664	-0.2160	-0.2746	-0.3430	-0.4219	-	
0.5120	-0.6141	-0.7290	-0.8574						
	0	-0.0001	-0.0010	-0.0034	-0.0080	-0.0156	-0.0270	-0.0429	
-0.0640	-0.0911	-0.1250	-0.1664	-0.2160	-0.2746	-0.3430	-0.4219	-	
0.5120	-0.6141	-0.7290	-0.8574						
	0	-0.0001	-0.0010	-0.0034	-0.0080	-0.0156	-0.0270	-0.0429	
-0.0640	-0.0911	-0.1250	-0.1664	-0.2160	-0.2746	-0.3430	-0.4219	-	
0.5120	-0.6141	-0.7290	-0.8574						
	0	-0.0001	-0.0010	-0.0034	-0.0080	-0.0156	-0.0270	-0.0429	
-0.0640	-0.0911	-0.1250	-0.1664	-0.2160	-0.2746	-0.3430	-0.4219	-	
0.5120	-0.6141	-0.7290	-0.8574						
	0	-0.0001	-0.0010	-0.0034	-0.0080	-0.0156	-0.0270	-0.0429	
-0.0640	-0.0911	-0.1250	-0.1664	-0.2160	-0.2746	-0.3430	-0.4219	-	
0.5120	-0.6141	-0.7290	-0.8574						
	0	-0.0001	-0.0010	-0.0034	-0.0080	-0.0156	-0.0270	-0.0429	
-0.0640	-0.0911	-0.1250	-0.1664	-0.2160	-0.2746	-0.3430	-0.4219	-	
0.5120	-0.6141	-0.7290	-0.8574						
	0	-0.0001	-0.0010	-0.0034	-0.0080	-0.0156	-0.0270	-0.0429	
-0.0640	-0.0911	-0.1250	-0.1664	-0.2160	-0.2746	-0.3430	-0.4219	-	
0.5120	-0.6141	-0.7290	-0.8574						
	0	-0.0001	-0.0010	-0.0034	-0.0080	-0.0156	-0.0270	-0.0429	
-0.0640	-0.0911	-0.1250	-0.1664	-0.2160	-0.2746	-0.3430	-0.4219	-	
0.5120	-0.6141	-0.7290	-0.8574						
	0	-0.0001	-0.0010	-0.0034	-0.0080	-0.0156	-0.0270	-0.0429	
-0.0640	-0.0911	-0.1250	-0.1664	-0.2160	-0.2746	-0.3430	-0.4219	-	
0.5120	-0.6141	-0.7290	-0.8574						
	0	-0.0001	-0.0010	-0.0034	-0.0080	-0.0156	-0.0270	-0.0429	
-0.0640	-0.0911	-0.1250	-0.1664	-0.2160	-0.2746	-0.3430	-0.4219	-	
0.5120	-0.6141	-0.7290	-0.8574						

[illegible]

[illegible]

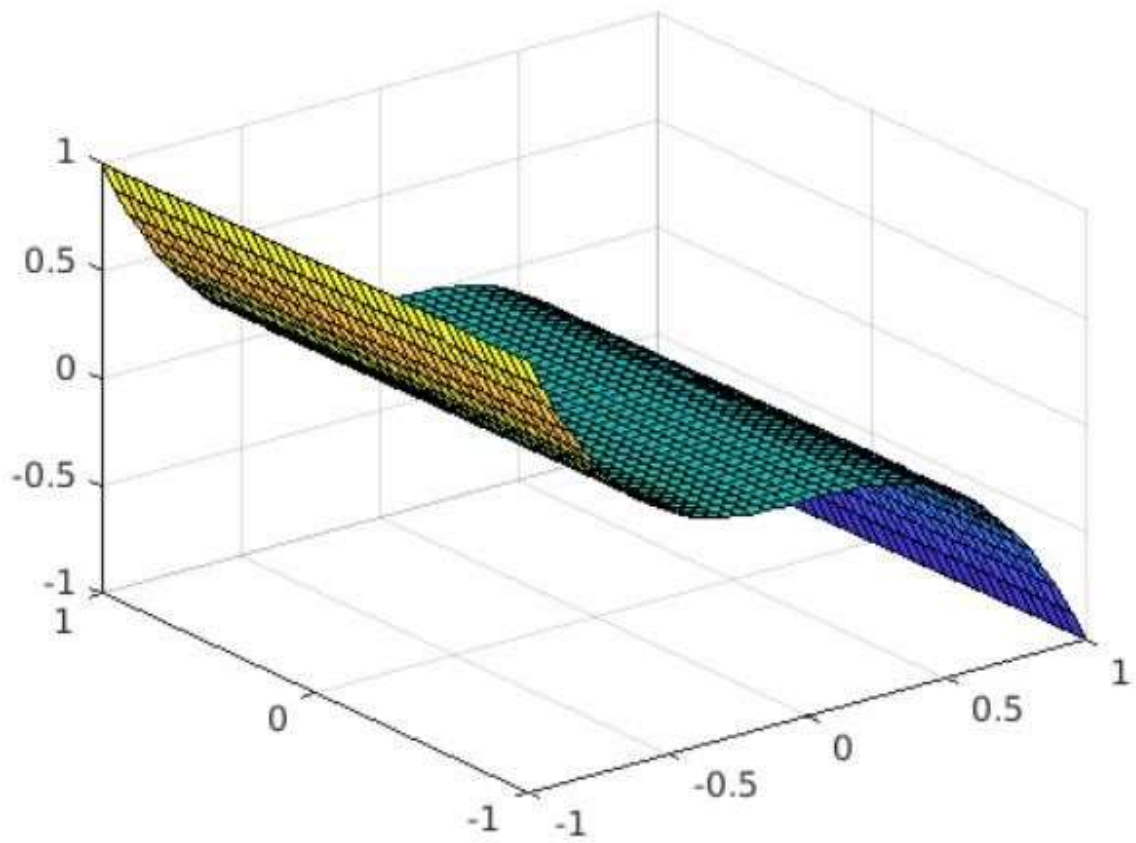
0.5120	-0.6141	-0.7290	-0.8574					
	0	-0.0001	-0.0010	-0.0034	-0.0080	-0.0156	-0.0270	-0.0429
-0.0640	-0.0911	-0.1250	-0.1664	-0.2160	-0.2746	-0.3430	-0.4219	-
0.5120	-0.6141	-0.7290	-0.8574					
	0	-0.0001	-0.0010	-0.0034	-0.0080	-0.0156	-0.0270	-0.0429
-0.0640	-0.0911	-0.1250	-0.1664	-0.2160	-0.2746	-0.3430	-0.4219	-
0.5120	-0.6141	-0.7290	-0.8574					

Column 41

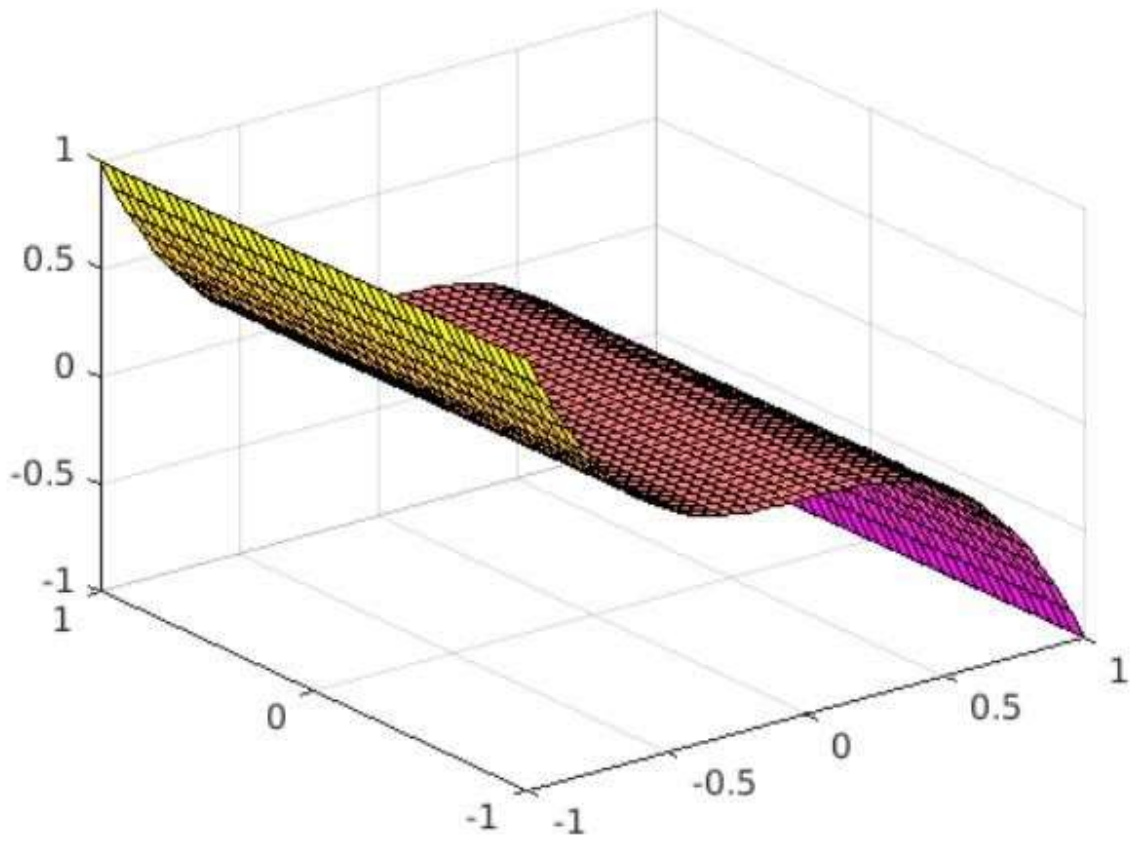
[illegible]

-1.0000
-1.0000
-1.0000
-1.0000
-1.0000
-1.0000
-1.0000
-1.0000
-1.0000
-1.0000
-1.0000

surf(x,y,z);



colormap [spring](#)



shading interp

