

```

%=====
Assignment 7 Code for Cubic Spline
%=====

function [a, b, c, d]=ncs(x, a)
%Natural Cubic Spline
%input n values x and a is the vector f(x)
%output the n-1 coefficients for the cubic polynomials
%    a, b, c, d

n=length(x);
h=zeros(n-1, 1);
alpha = zeros(n-2, 1);
l=zeros(n, 1);
mu=zeros(n-1, 1);
z=zeros(n, 1);

for i=1:n-1
    h(i)=x(i+1)-x(i);
end

for i=2:n-1
    alpha(i)=3/h(i)*(a(i+1)-a(i))-3/h(i-1)*(a(i)-a(i-1)));
end
l(1)=1;
%mu(1) and z(1) are already zero
for i=2:n-1
    l(i)=2*(x(i+1)-x(i-1))-h(i-1)*mu(i-1);
    mu(i)=h(i)/l(i);
    z(i)=(alpha(i)-h(i-1)*z(i-1))/l(i);
end
%l(n)=1; not needed
%z(n)=0 already
c=zeros(1, n); %sets c(n)=0

for j=n-1:-1:1
    c(j)=z(j)-mu(j)*c(j+1);
    b(j)=(a(j+1)-a(j))/h(j) - h(j)*(c(j+1)+2*c(j))/3;
    d(j)=(c(j+1)-c(j))/(3*h(j));
end

%clean-up
c=c(1, 1:n-1);
a=a(1, 1:n-1);

function [a, b, c, d]=ccs(x, a, FP0, FPN)
%input n values x and a is the vector f(x), FP0=f'(x_0),
%    FPN=f'(x_n)
%output the n-1 coefficients for the cubic polynomials
%    a, b, c, d

n=length(x);
h=zeros(n-1, 1);
alpha = zeros(n, 1);
l=zeros(n, 1);
mu=zeros(n-1, 1);
z=zeros(n, 1);

for i=1:n-1
    h(i)=x(i+1)-x(i);
end

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al pha(1)=3*(a(2)-a(1))/h(1)-3*FP0;
al pha(n)=3*FPN-3*(a(n)-a(n-1))/h(n-1);

for i=2:n-1
    al pha(i)=3/h(i)*(a(i+1)-a(i))-3/h(i-1)*(a(i)-a(i-1));
end

l(1)=2*h(1);
mu(1)=0.5;
z(1)=al pha(1)/l(1);

for i=2:n-1
    l(i)=2*(x(i+1)-x(i-1))-h(i-1)*mu(i-1);
    mu(i)=h(i)/l(i);
    z(i)=(al pha(i)-h(i-1)*z(i-1))/l(i);
end
l(n)=h(n-1)*(2-mu(n-1));
z(n)=(al pha(n)-h(n-1)*z(n-1))/l(n);
c=zeros(1,n);
c(n)=z(n);

for j=n-1:-1:1
    c(j)=z(j)-mu(j)*c(j+1);
    b(j)=(a(j+1)-a(j))/h(j) - h(j)*(c(j+1)+2*c(j))/3;
    d(j)=(c(j+1)-c(j))/(3*h(j));
end

%cl ean-up
c=c(1,1:n-1);
a=a(1,1:n-1);

%Tradi ti onal method evaluate spline
functi on [X,y]=cub(x,a,b,c,d,i1,i2)
%eval ute the cubi c spline wi th the coeffi ci ents a,b,c,d based on the poi nts
%(x,f(x)) from the poi nt i1 to the poi nt i2

X = i1:0.01:i2;
y = zeros(1,length(X));
j=2;
n=length(a);
i=1;

whi le i <= length(X)
    i f (X(i)<x(j))
        y(i) =
a(j-1)+b(j-1)*(X(i)-x(j-1))+c(j-1)*(X(i)-x(j-1))^2+d(j-1)*(X(i)-x(j-1))^3;
    el sei f X(i) > x(j) && j < n
        j=j+1;
        y(i) =
a(j-1)+b(j-1)*(X(i)-x(j-1))+c(j-1)*(X(i)-x(j-1))^2+d(j-1)*(X(i)-x(j-1))^3;
    el sei f X(i)>x(n) &&j==n
        y(i) = a(n)+b(n)*(X(i)-x(n))+c(n)*(X(i)-x(n))^2+d(n)*(X(i)-x(n))^3;
    el se
        error(' Probl em wi th i ndexi ng' )
    end
    i=i+1;
end

%Matl ab Features method evaluate spline
functi on [X,Y]=cub2(x,a,b,c,d,i1,i2)

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```
X = i 1: 0. 01: i 2;
n=length(a);
Y=zeros(1, length(X));
for j =2: n
    if j==2
        P = (X <= x(j));
        Y(P) = a(1)+b(1). *(X(P)-x(1)) +c(1). *(X(P)-x(1)). ^2 +d(1). *(X(P)-x(1)). ^3;
    else %j >2 && j <=n
        P=(X >x(j -1) & X <=x(j));
        Y(P) = a(j -1)+b(j -1). *(X(P)-x(j -1))+c(j -1). *(X(P)-x(j -1)). ^2
+d(j -1). *(X(P)-x(j -1)). ^3;
    end
    P=(X>x(n));
    Y(P) = a(n)+b(n). *(X(P)-x(n)) +c(n). *(X(P)-x(n)). ^2 +d(n). *(X(P)-x(n)). ^3;
end
```

```
%=====
Assignment 7 Questions 1 & 2
%=====
```

```
%Snoopy Data
x1=[1 2 5 6 7 8 10 13 17];
y1=[3. 0, 3. 7, 3. 9, 4. 2, 5. 7, 6. 6, 7. 1, 6. 7, 4. 5];
fp10=1. 0;
fp1n=-0. 67;
x2=[17, 20, 23, 24, 25, 27, 27. 7];
y2=[4. 5, 7, 6. 1, 5. 6, 5. 8, 5. 2, 4. 1];
fp20=3;
fp2n=-4;
x3=[27. 7, 28, 29, 30];
y3=[4. 1, 4. 3, 4. 1, 3];
fp30=0. 33;
fp3n=-1. 5;
```

```
%Question 32, page 164
```

```
[a1, b1, c1, d1]=ccs(x1, y1, fp10, fp1n)
[a2, b2, c2, d2]=ccs(x2, y2, fp20, fp2n)
[a3, b3, c3, d3]=ccs(x3, y3, fp30, fp3n)

[X1, Y1]=cub2(x1, a1, b1, c1, d1, x1(1), x1(length(x1)));
[X2, Y2]=cub2(x2, a2, b2, c2, d2, x2(1), x2(length(x2)));
[X3, Y3]=cub2(x3, a3, b3, c3, d3, x3(1), x3(length(x3)));

subplot(2, 1, 1)
plot(X1, Y1, X2, Y2, X3, Y3, x1, y1, ' *', x2, y2, ' *', x3, y3, ' *');
title(' Question 32, page 164')
```

```
%Question 33, page 164
```

```
[a1, b1, c1, d1]=ncs(x1, y1)
[a2, b2, c2, d2]=ncs(x2, y2)
[a3, b3, c3, d3]=ncs(x3, y3)

[X1, Y1]=cub2(x1, a1, b1, c1, d1, x1(1), x1(length(x1)));
[X2, Y2]=cub2(x2, a2, b2, c2, d2, x2(1), x2(length(x2)));
[X3, Y3]=cub2(x3, a3, b3, c3, d3, x3(1), x3(length(x3)));

subplot(2, 1, 2)
plot(X1, Y1, X2, Y2, X3, Y3, x1, y1, ' *', x2, y2, ' *', x3, y3, ' *');
title(' Question 33, page 164')
```

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>> snoopy

% Questi on 32

a1 =

3. 0000 3. 7000 3. 9000 4. 2000 5. 7000 6. 6000 7. 1000 6. 7000

b1 =

1. 0000 0. 4468 -0. 0745 1. 0163 1. 4091 0. 5472 0. 0485 -0. 3381

c1 =

-0. 3468 -0. 2064 0. 0326 1. 0582 -0. 6654 -0. 1965 -0. 0529 -0. 0759

d1 =

0. 0468 0. 0266 0. 3419 -0. 5745 0. 1563 0. 0239 -0. 0026 0. 0057

a2 =

4. 5000 7. 0000 6. 1000 5. 6000 5. 8000 5. 2000

b2 =

3. 0000 -0. 1979 -0. 6085 -0. 1114 0. 1540 -0. 4012

c2 =

-1. 1007 0. 0348 -0. 1716 0. 6688 -0. 4034 0. 1258

d2 =

0. 1262 -0. 0229 0. 2801 -0. 3574 0. 0882 -2. 5680

a3 =

4. 1000 4. 3000 4. 1000

b3 =

0. 3300 0. 6614 -0. 7653

c3 =

2. 2620 -1. 1574 -0. 2693

d3 =

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-3. 7994 0. 2960 -0. 0653

%Questi on 33

a1 =

3. 0000 3. 7000 3. 9000 4. 2000 5. 7000 6. 6000 7. 1000 6. 7000

b1 =

0. 7857 0. 5286 -0. 0858 1. 0194 1. 4083 0. 5474 0. 0491 -0. 3417

c1 =

0 -0. 2571 0. 0523 1. 0529 -0. 6640 -0. 1969 -0. 0522 -0. 0781

d1 =

-0. 0857 0. 0344 0. 3335 -0. 5723 0. 1557 0. 0241 -0. 0029 0. 0065

a2 =

4. 5000 7. 0000 6. 1000 5. 6000 5. 8000 5. 2000

b2 =

1. 1057 0. 2885 -0. 6599 -0. 1366 0. 3061 -1. 2633

c2 =

0 -0. 2724 -0. 0437 0. 5670 -0. 1244 -0. 6603

d2 =

-0. 0303 0. 0254 0. 2036 -0. 2305 -0. 0893 0. 3144

a3 =

4. 1000 4. 3000 4. 1000

b3 =

0. 7486 0. 5028 -0. 7865

c3 =

0 -0. 8191 -0. 4702

d3 =

-0. 9102 0. 1163 0. 1567

>>

```
%=====
Assignment 7 Questions 3 & 4
%=====
```

```
function q3q4(studno)
```

```
seed=studno-200200000
```

```
% create data
rand(' seed' , seed);
X=rand(1, 100)*10;
X = sort(X);
rand(' seed' , studno);
Y = rand(1, 100)*10-5;
```

```
%Question 3
[a1, b1, c1, d1]=ncs(X, Y)
[X31, Y31]=cub(X, a1, b1, c1, d1, 0, 10);
[X32, Y32]=cub2(X, a1, b1, c1, d1, 0, 10);
```

```
subplot(2, 1, 1)
plot(X31, Y31, X32, Y32, X, Y, ' *' )
title(' Question 3 - Natural Cubl ic Spl ine' )
```

```
%Question 4
[a2, b2, c2, d2]=ccs(X, Y, 1, -2)
[X33, Y33]=cub(X, a1, b1, c1, d1, 0, 10);
[X34, Y34]=cub2(X, a1, b1, c1, d1, 0, 10);
```

```
subplot(2, 1, 2)
plot(X33, Y33, X34, Y34, X, Y, ' *' )
title(' Question 4 - Clamped Cubl ic Spl ine' )
```

```
plot(X, Y)
```

```
q3q4
```

```
a1 =
```

```
Columns 1 through 8
```

```
-4. 6234    4. 1288    2. 4608    -1. 0750    2. 7515    -4. 7182    1. 2358    -0. 7068
```

```
Columns 9 through 16
```

```
0. 8600    4. 6378    -2. 4538    -0. 8088    -3. 9299    0. 6892    3. 2472    -3. 5248
```

```
Columns 17 through 24
```

```
-1. 3032    -3. 5263    3. 0699    -3. 4906    3. 8908    3. 3445    0. 1933    -0. 9944
```

```
Columns 25 through 32
```

```
-3. 6389    0. 7993    4. 6239    3. 6870    -2. 2487    -3. 6700    -1. 7973    2. 7198
```

```
Columns 33 through 40
```

```
2. 3557    1. 8128    -2. 6105    4. 7179    3. 5143    -4. 8415    -0. 9102    2. 8537
```

```
Columns 41 through 48
```

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2. 1909	2. 9866	-3. 5987	-3. 1413	4. 7237	1. 5302	-1. 8903	-0. 9761
Col umns 49 through 56							
-4. 6241	2. 5188	4. 0444	3. 7659	2. 7998	-2. 9489	-1. 5796	1. 4277
Col umns 57 through 64							
-4. 2156	-0. 8225	-3. 2833	-3. 1307	3. 0472	3. 4562	-2. 4044	-0. 6527
Col umns 65 through 72							
0. 2420	-3. 3686	3. 2726	2. 3965	-2. 5580	-2. 0495	4. 0809	-2. 5055
Col umns 73 through 80							
-0. 3527	2. 9873	-2. 6019	-0. 7105	-1. 7941	-3. 7559	4. 0273	-3. 6129
Col umns 81 through 88							
-2. 7043	-1. 4561	-3. 3688	1. 4070	-2. 2661	3. 8014	-0. 4814	-1. 6455
Col umns 89 through 96							
4. 1932	-4. 3778	2. 0047	3. 5138	-3. 4561	2. 8157	2. 9635	-3. 1823
Col umns 97 through 99							
-4. 5669	3. 6457	3. 9088					

b1 =

Col umns 1 through 8							
118. 3838	55. 8134	-132. 6036	226. 1066	148. 1625	62. 7237	156. 0141	-114. 4723
Col umns 9 through 16							
65. 2069	11. 4344	-24. 6110	-6. 8171	23. 4732	53. 5436	-62. 3713	18. 8777
Col umns 17 through 24							
-59. 6822	8. 6446	-122. 5745	-129. 9310	114. 4501	-30. 1698	-85. 5983	-140. 3189
Col umns 25 through 32							
587. 2257	591. 1484	-111. 6448	18. 7437	-32. 8702	5. 1277	48. 5488	11. 7304
Col umns 33 through 40							
-9. 8018	-51. 2100	73. 7614	116. 7761	-146. 0155	-78. 5425	98. 8437	12. 6610
Col umns 41 through 48							
-4. 2953	-55. 3803	-55. 7375	62. 1033	-27. 2773	-75. 2666	-23. 1493	23. 8016
Col umns 49 through 56							
-44. 0183	467. 3603	488. 2258	-47. 9816	-18. 5561	-36. 5660	132. 3984	39. 4251
Col umns 57 through 64							

-128.6444	36.3300	-18.4467	14.4404	48.1052	-87.0597	-68.5719	125.8994
Columns 65 through 72							
-438.7083	34.5032	355.3092	-200.4502	-26.2289	155.2890	157.9610	-112.7479
Columns 73 through 80							
71.0015	-95.2310	-111.2432	-12.9776	-95.7370	-86.0195	121.0510	38.0614
Columns 81 through 88							
53.0202	9.5101	0.7591	-87.3846	170.2313	135.4733	-112.4030	61.0079
Columns 89 through 96							
-136.4266	47.6953	220.8971	-168.3380	-128.5113	199.6237	-83.9805	-28.6742
Columns 97 through 99							
71.6662	27.8607	10.7775					

c1 =

1.0e+04 *

Columns 1 through 8

0	-0.0697	-0.1957	0.7534	-1.2426	1.0985	-0.7823	0.1488
---	---------	---------	--------	---------	--------	---------	--------

Columns 9 through 16

-0.0144	-0.0469	0.0299	-0.0228	0.0363	-0.0065	-0.0265	0.0838
---------	---------	--------	---------	--------	---------	---------	--------

Columns 17 through 24

-0.1600	0.3368	-0.4766	0.4561	-0.1766	0.0563	-0.0989	-0.3963
---------	--------	---------	--------	---------	--------	---------	---------

Columns 25 through 32

1.1400	-1.0855	0.2721	-0.0437	0.0188	-0.0015	0.0458	-0.0866
--------	---------	--------	---------	--------	---------	--------	---------

Columns 33 through 40

0.0380	-0.1921	0.3565	-0.2701	-0.1975	0.3253	-0.0713	-0.0509
--------	---------	--------	---------	---------	--------	---------	---------

Columns 41 through 48

0.0313	-0.0529	0.0525	0.0487	-0.1116	0.0179	0.0646	-0.0093
--------	---------	--------	--------	---------	--------	--------	---------

Columns 49 through 56

-0.0094	0.9018	-0.2401	0.1017	-0.0252	0.0134	0.2640	-0.6440
---------	--------	---------	--------	---------	--------	--------	---------

Columns 57 through 64

0.2906	-0.1383	0.0808	-0.0015	0.0148	-0.2219	0.2590	0.1524
--------	---------	--------	---------	--------	---------	--------	--------

Columns 65 through 72

-0.5688	4.5468	-2.6350	0.2791	-0.1041	0.3292	-0.3209	0.0881
---------	--------	---------	--------	---------	--------	---------	--------

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Col umns 73 through 80

-0.0007 -0.0744 0.0420 -0.0252 -0.3009 0.3555 -0.1216 0.0934

Col umns 81 through 88

-0.0130 -0.1161 0.1051 -0.1587 0.4731 -0.5907 0.1906 0.2517

Col umns 89 through 96

-0.4804 0.8253 -0.2952 -1.5079 1.6680 -0.7398 0.0508 -0.0160

Col umns 97 through 99

0.0633 -0.1055 -0.0023

d1 =

1.0e+06 *

Col umns 1 through 8

-0.0026 -0.0059 0.0492 -0.4175 0.1316 -0.2125 0.0727 -0.0041

Col umns 9 through 16

-0.0012 0.0012 -0.0007 0.0009 -0.0014 -0.0002 0.0026 -0.0079

Col umns 17 through 24

0.0428 -0.0289 0.0864 -0.0241 0.0065 -0.0040 -0.0897 0.0523

Col umns 25 through 32

-1.0295 0.0524 -0.0184 0.0010 -0.0003 0.0016 -0.0049 0.0094

Col umns 33 through 40

-0.0285 0.0241 -0.0420 0.0043 0.0330 -0.0189 0.0010 0.0032

Col umns 41 through 48

-0.0012 0.0038 -0.0001 -0.0038 0.0084 0.0025 -0.0029 -0.0000

Col umns 49 through 56

0.0530 -1.2070 0.0029 -0.0110 0.0008 0.0137 -0.1237 0.0655

Col umns 57 through 64

-0.0132 0.0077 -0.0066 0.0002 -0.0121 0.0322 -0.0075 -0.0177

Col umns 65 through 72

1.4335 -1.4266 0.4118 -0.0128 0.0179 -0.0676 0.0117 -0.0014

Col umns 73 through 80

-0.0011 0.0078 -0.0004 -0.0362 0.1231 -0.0180 0.0024 -0.0191

Col umns 81 through 88

			assi gn7sol . txt					
-0. 0102	0. 0093	-0. 0053	0. 0257	-0. 1200	0. 0420	0. 0052	-0. 0283	
Col umns 89 through 96								
0. 0815	-0. 1143	-0. 1873	0. 4255	-0. 2270	0. 0640	-0. 0014	0. 0012	
Col umns 97 through 99								
-0. 0054	0. 0217	0. 0001						

a2 =

Col umns 1 through 8								
-4. 6234	4. 1288	2. 4608	-1. 0750	2. 7515	-4. 7182	1. 2358	-0. 7068	
Col umns 9 through 16								
0. 8600	4. 6378	-2. 4538	-0. 8088	-3. 9299	0. 6892	3. 2472	-3. 5248	
Col umns 17 through 24								
-1. 3032	-3. 5263	3. 0699	-3. 4906	3. 8908	3. 3445	0. 1933	-0. 9944	
Col umns 25 through 32								
-3. 6389	0. 7993	4. 6239	3. 6870	-2. 2487	-3. 6700	-1. 7973	2. 7198	
Col umns 33 through 40								
2. 3557	1. 8128	-2. 6105	4. 7179	3. 5143	-4. 8415	-0. 9102	2. 8537	
Col umns 41 through 48								
2. 1909	2. 9866	-3. 5987	-3. 1413	4. 7237	1. 5302	-1. 8903	-0. 9761	
Col umns 49 through 56								
-4. 6241	2. 5188	4. 0444	3. 7659	2. 7998	-2. 9489	-1. 5796	1. 4277	
Col umns 57 through 64								
-4. 2156	-0. 8225	-3. 2833	-3. 1307	3. 0472	3. 4562	-2. 4044	-0. 6527	
Col umns 65 through 72								
0. 2420	-3. 3686	3. 2726	2. 3965	-2. 5580	-2. 0495	4. 0809	-2. 5055	
Col umns 73 through 80								
-0. 3527	2. 9873	-2. 6019	-0. 7105	-1. 7941	-3. 7559	4. 0273	-3. 6129	
Col umns 81 through 88								
-2. 7043	-1. 4561	-3. 3688	1. 4070	-2. 2661	3. 8014	-0. 4814	-1. 6455	
Col umns 89 through 96								
4. 1932	-4. 3778	2. 0047	3. 5138	-3. 4561	2. 8157	2. 9635	-3. 1823	
Col umns 97 through 99								

-4. 5669 3. 6457 3. 9088

b2 =

Col umns 1 through 8

1. 0000 83. 6428 -139. 4291 226. 9144 147. 8377 62. 7841 155. 9946 -114. 4647

Col umns 9 through 16

65. 2052 11. 4350 -24. 6112 -6. 8171 23. 4732 53. 5436 -62. 3713 18. 8777

Col umns 17 through 24

-59. 6822 8. 6446 -122. 5745 -129. 9310 114. 4501 -30. 1698 -85. 5983 -140. 3189

Col umns 25 through 32

587. 2257 591. 1484 -111. 6448 18. 7437 -32. 8702 5. 1277 48. 5488 11. 7304

Col umns 33 through 40

-9. 8018 -51. 2100 73. 7614 116. 7761 -146. 0155 -78. 5425 98. 8437 12. 6610

Col umns 41 through 48

-4. 2953 -55. 3803 -55. 7375 62. 1033 -27. 2773 -75. 2666 -23. 1493 23. 8016

Col umns 49 through 56

-44. 0183 467. 3603 488. 2258 -47. 9816 -18. 5561 -36. 5660 132. 3984 39. 4251

Col umns 57 through 64

-128. 6444 36. 3300 -18. 4467 14. 4404 48. 1052 -87. 0597 -68. 5719 125. 8994

Col umns 65 through 72

-438. 7083 34. 5032 355. 3092 -200. 4502 -26. 2289 155. 2890 157. 9610 -112. 7479

Col umns 73 through 80

71. 0015 -95. 2310 -111. 2432 -12. 9776 -95. 7370 -86. 0195 121. 0510 38. 0614

Col umns 81 through 88

53. 0202 9. 5101 0. 7591 -87. 3846 170. 2313 135. 4733 -112. 4030 61. 0079

Col umns 89 through 96

-136. 4266 47. 6953 220. 8971 -168. 3381 -128. 5111 199. 6228 -83. 9767 -28. 7080

Col umns 97 through 99

71. 8191 27. 4216 11. 7663

c2 =

1. 0e+04 *

Col umns 1 through 8

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0. 2306	-0. 1385	-0. 1757	0. 7453	-1. 2416	1. 0982	-0. 7822	0. 1488
Col umns 9 through 16							
-0. 0144	-0. 0469	0. 0299	-0. 0228	0. 0363	-0. 0065	-0. 0265	0. 0838
Col umns 17 through 24							
-0. 1600	0. 3368	-0. 4766	0. 4561	-0. 1766	0. 0563	-0. 0989	-0. 3963
Col umns 25 through 32							
1. 1400	-1. 0855	0. 2721	-0. 0437	0. 0188	-0. 0015	0. 0458	-0. 0866
Col umns 33 through 40							
0. 0380	-0. 1921	0. 3565	-0. 2701	-0. 1975	0. 3253	-0. 0713	-0. 0509
Col umns 41 through 48							
0. 0313	-0. 0529	0. 0525	0. 0487	-0. 1116	0. 0179	0. 0646	-0. 0093
Col umns 49 through 56							
-0. 0094	0. 9018	-0. 2401	0. 1017	-0. 0252	0. 0134	0. 2640	-0. 6440
Col umns 57 through 64							
0. 2906	-0. 1383	0. 0808	-0. 0015	0. 0148	-0. 2219	0. 2590	0. 1524
Col umns 65 through 72							
-0. 5688	4. 5468	-2. 6350	0. 2791	-0. 1041	0. 3292	-0. 3209	0. 0881
Col umns 73 through 80							
-0. 0007	-0. 0744	0. 0420	-0. 0252	-0. 3009	0. 3555	-0. 1216	0. 0934
Col umns 81 through 88							
-0. 0130	-0. 1161	0. 1051	-0. 1587	0. 4731	-0. 5907	0. 1906	0. 2517
Col umns 89 through 96							
-0. 4804	0. 8253	-0. 2952	-1. 5079	1. 6680	-0. 7398	0. 0508	-0. 0160
Col umns 97 through 99							
0. 0634	-0. 1062	0. 0074					

d2 =

1. 0e+06 *

Col umns 1 through 8							
-0. 0137	-0. 0017	0. 0477	-0. 4156	0. 1315	-0. 2125	0. 0727	-0. 0041
Col umns 9 through 16							
-0. 0012	0. 0012	-0. 0007	0. 0009	-0. 0014	-0. 0002	0. 0026	-0. 0079

assi gn7sol . txt

Col umns 17 through 24

0. 0428 -0. 0289 0. 0864 -0. 0241 0. 0065 -0. 0040 -0. 0897 0. 0523

Col umns 25 through 32

-1. 0295 0. 0524 -0. 0184 0. 0010 -0. 0003 0. 0016 -0. 0049 0. 0094

Col umns 33 through 40

-0. 0285 0. 0241 -0. 0420 0. 0043 0. 0330 -0. 0189 0. 0010 0. 0032

Col umns 41 through 48

-0. 0012 0. 0038 -0. 0001 -0. 0038 0. 0084 0. 0025 -0. 0029 -0. 0000

Col umns 49 through 56

0. 0530 -1. 2070 0. 0029 -0. 0110 0. 0008 0. 0137 -0. 1237 0. 0655

Col umns 57 through 64

-0. 0132 0. 0077 -0. 0066 0. 0002 -0. 0121 0. 0322 -0. 0075 -0. 0177

Col umns 65 through 72

1. 4335 -1. 4266 0. 4118 -0. 0128 0. 0179 -0. 0676 0. 0117 -0. 0014

Col umns 73 through 80

-0. 0011 0. 0078 -0. 0004 -0. 0362 0. 1231 -0. 0180 0. 0024 -0. 0191

Col umns 81 through 88

-0. 0102 0. 0093 -0. 0053 0. 0257 -0. 1200 0. 0420 0. 0052 -0. 0283

Col umns 89 through 96

0. 0815 -0. 1143 -0. 1873 0. 4255 -0. 2270 0. 0640 -0. 0014 0. 0012

Col umns 97 through 99

-0. 0054 0. 0239 -0. 0011

```
%=====
Assi gnment 7 Questi on 5
%=====
```

functi on i nt=a7q5(n)

```
x=2*rand(1, n); % values from zero to 2
y=rand(1, n); % values from zero to 1
area = 2*1;
K = (y <= (si n(x)+cos(x)). ^3 /4);
i nt = area*sum(K)/l ength(K);
```

```
%=====
Assi gnment 7 Questi on 6
%=====
```

functi on i nt=a7q6(n)

```

x=rand(1, n); % values from zero to 1
y=rand(1, n); % values from zero to 1
K = (y <= exp(-x.^2));
int = sum(K)/length(K);

%=====
Assignment 7 Question 7
%=====

function I = a7q7(N, M);
%Input N - number of repetitions, M - size of the scaled Random Walk
%Output I - a vector of length N. Each I(i) is the area scaled SW

I = zeros(1, N);
for i=1: N
    [B, x]=SRW(M); % SRW is a function given to students to compute a scaled SRW.
    I(i)=trapz(x, B);
end

%=====
Assignment 7 Question 8
%=====

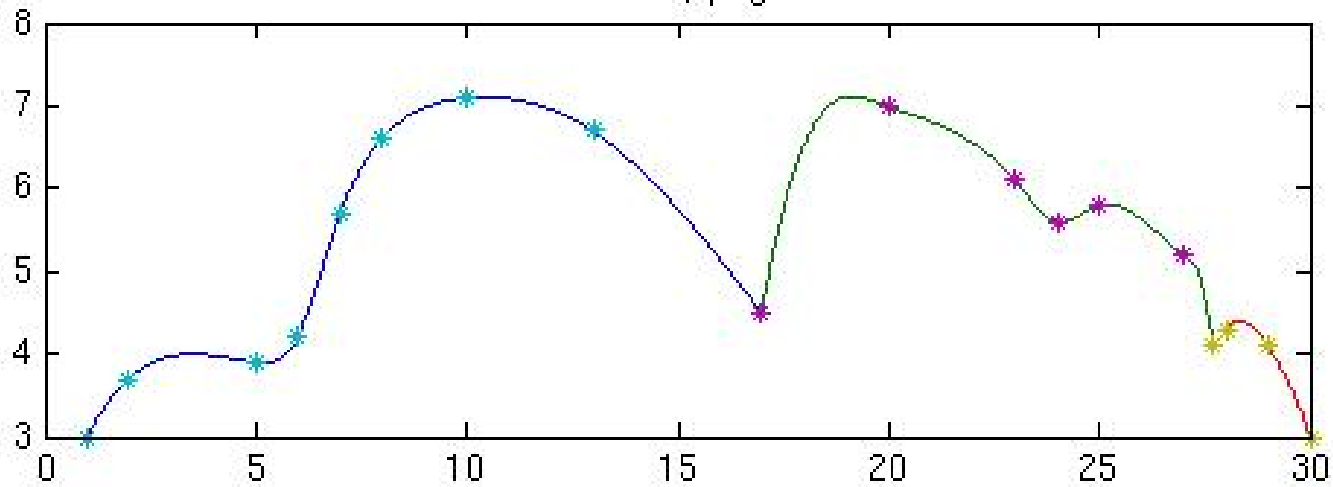
function I = a7q8(N, M);
%Input N - number of repetitions, M - size of the scaled Random Walk
%Output I - a vector of length N. Each I(i) is the area of a transformed
% scaled RW

mu=2;
sigma=0.5;

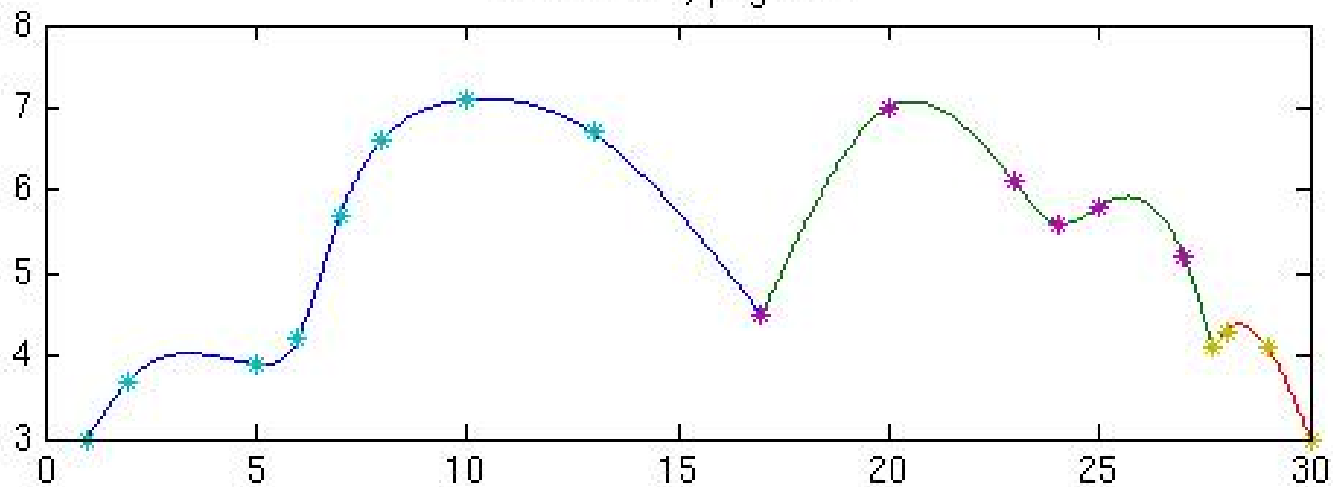
I = zeros(1, N);
for i=1: N
    [B, x]=SRW(M); % SRW is a function given to students to compute a scaled SRW.
    Z = exp(sigma*B + mu*x);
    I(i)=trapz(x, Z);
end

```

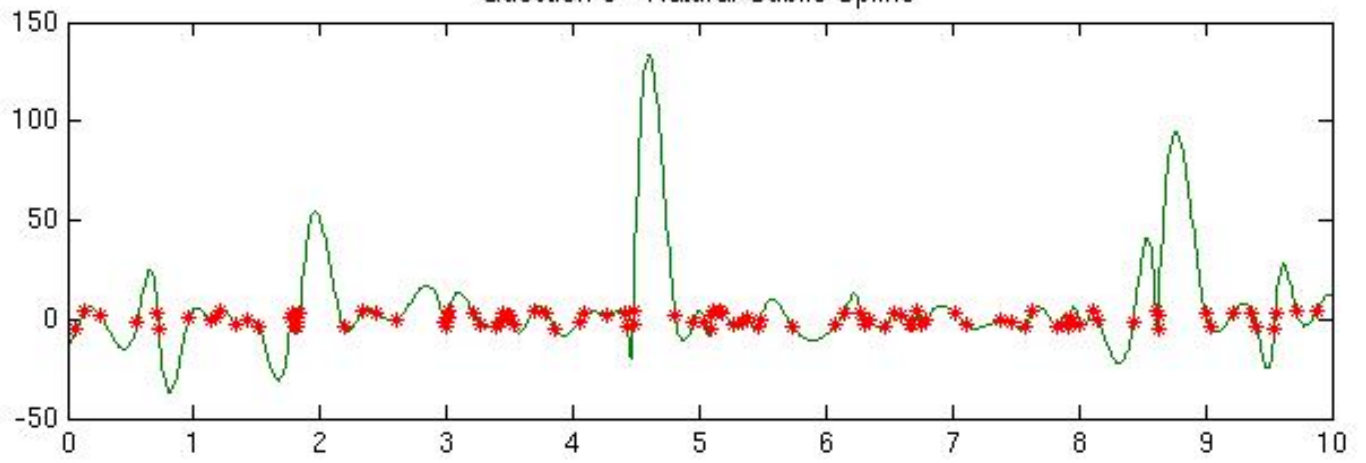
Question 32, page 164



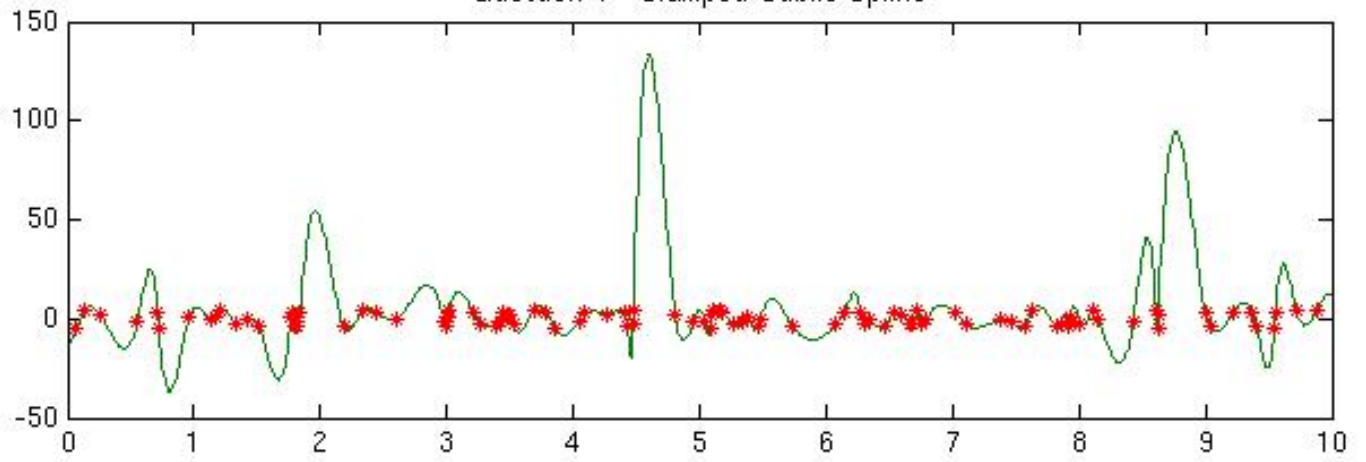
Question 33, page 164



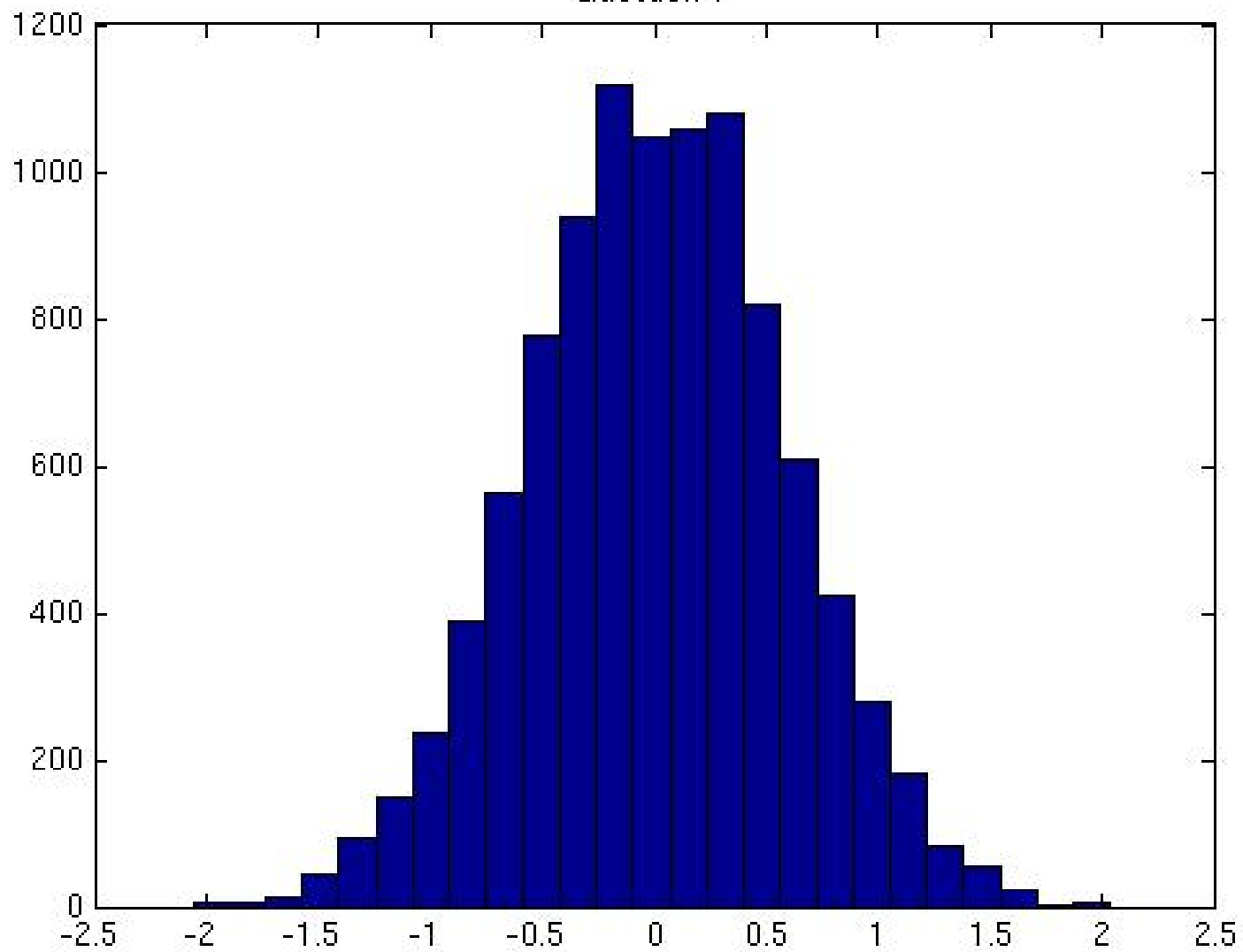
Question 3 - Natural Cubic Spline



Question 4 - Clamped Cubic Spline



Question 7



Question 8

