

```

20 - g2 = -(x1 - x2 + 2)/(x1/2 + x2/2 - 1) - 1/(2*ta*(x1/2 + x2/2 - 101/100)) - ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^2);
21
22 - h11 = 2/(x1/2 + x2/2 - 1) + 1/(4*ta*(x1/2 + x2/2 - 101/100)^2) + ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^3) - (2*x1 - x2 + 2)/(x1/2 + x2/2 - 1)^2;
23
24 - h12 = (x1 - x2 + 2)/(2*(x1/2 + x2/2 - 1)^2) - 1/(x1/2 + x2/2 - 1) + 1/(4*ta*(x1/2 + x2/2 - 101/100)^2) + ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^3) - (2*x1 - x2 + 2)/(2*(x1/2 + x2/2 - 1)^2);
25
26 - h21 = (x1 - x2 + 2)/(2*(x1/2 + x2/2 - 1)^2) - 1/(x1/2 + x2/2 - 1) + 1/(4*ta*(x1/2 + x2/2 - 101/100)^2) + ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^3) - (2*x1 - x2 + 2)/(2*(x1/2 + x2/2 - 1)^2);
27
28 - h22 = 1/(x1/2 + x2/2 - 1) + (x1 - x2 + 2)/(x1/2 + x2/2 - 1)^2 + 1/(4*ta*(x1/2 + x2/2 - 101/100)^2) + ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^3);
29
30
31 - G = [g1; g2];
32 - H = [h11 h12; h21 h22];
33 - dk = -inv(H)*G;
34
35 %update alpha
36 if c'*dk <= 0
37     alpha = (de - c'*X - d)*(c'*dk)^(-1)*0.99;
38 else

```

```

P411.m  P414.m  +
1 - A = [1 -0.5; 0 0.5];
2 - b = [1; -1];
3 - c = [0.5; 0.5];
4 - d = -1;
5 - de = 0.01;
6 - e = 0.00000001;
7 - global ta;
8 - ta = 1;
9
10 %disp(X);
11 - x1 = 2;
12 - x2 = 2;
13 - X = [x1; x2];
14
15 - x1 = X(1);
16 - x2 = X(2);
17
18
19 - g1 = (2*x1 - x2 + 2)/(x1/2 + x2/2 - 1) - ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^2) - 1/(2*ta*(x1/2 + x2/2 - 101/100));

```

```

39 - alpha = 1;
40 - end
41
42 while 1/ta >= e
43     while norm(alpha*dk, 2) >= e
44         X = X + alpha*dk;
45         x1 = X(1);
46         x2 = X(2);
47
48         g1 = (2*x1 - x2 + 2)/(x1/2 + x2/2 - 1) - ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^2) - 1/(2*ta*(x1/2 + x2/2 - 101/100));
49         g2 = -(x1 - x2 + 2)/(x1/2 + x2/2 - 1) - 1/(2*ta*(x1/2 + x2/2 - 101/100)) - ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^2);
50
51         h11 = 2/(x1/2 + x2/2 - 1) + 1/(4*ta*(x1/2 + x2/2 - 101/100)^2) + ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^3) - (2*x1 - x2 + 2)/(x1/2 + x2/2 - 1)^2;
52
53         h12 = (x1 - x2 + 2)/(2*(x1/2 + x2/2 - 1)^2) - 1/(x1/2 + x2/2 - 1) + 1/(4*ta*(x1/2 + x2/2 - 101/100)^2) + ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^3) - (2*x1 - x2 + 2)/(2*(x1/2 + x2/2 - 1)^2);
54
55         h21 = (x1 - x2 + 2)/(2*(x1/2 + x2/2 - 1)^2) - 1/(x1/2 + x2/2 - 1) + 1/(4*ta*(x1/2 + x2/2 - 101/100)^2) + ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^3) - (2*x1 - x2 + 2)/(2*(x1/2 + x2/2 - 1)^2);
56
57         h22 = 1/(x1/2 + x2/2 - 1) + (x1 - x2 + 2)/(x1/2 + x2/2 - 1)^2 + 1/(4*ta*(x1/2 + x2/2 - 101/100)^2) + ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^3);
58
59 - G = [g1; g2];
60 - H = [h11 h12; h21 h22];
61 - dk = -inv(H)*G;
62
63 if c'*dk <= 0
64     alpha = (de - c'*X - d)*(c'*dk)^(-1)*0.99;
65 else
66     alpha = 1;
67 end
68
69 end
70
71
72
73 X = X + alpha*dk;
74 x1 = X(1);
75 x2 = X(2);
76

```

```

58
59 - h22 = 1/(x1/2 + x2/2 - 1) + (x1 - x2 + 2)/(x1/2 + x2/2 - 1)^2 + 1/(4*ta*(x1/2 + x2/2 - 101/100)^2) + ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^3);
60
61 - G = [g1; g2];
62 - H = [h11 h12; h21 h22];
63 - dk = -inv(H)*G;
64
65 if c'*dk <= 0
66     alpha = (de - c'*X - d)*(c'*dk)^(-1)*0.99;
67 else
68     alpha = 1;
69 end
70
71
72
73 X = X + alpha*dk;
74 x1 = X(1);
75 x2 = X(2);
76

```

```

77 - g1 = (2*x1 - x2 + 2)/(x1/2 + x2/2 - 1) - ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^2) - 1/(2*ta*(x1/2 + x2/2 - 101/100));
78 - g2 = -(x1 - x2 + 2)/(x1/2 + x2/2 - 1) - 1/(2*ta*(x1/2 + x2/2 - 101/100)) - ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^2);
79
80 - h11 = 2/(x1/2 + x2/2 - 1) + 1/(4*ta*(x1/2 + x2/2 - 101/100)^2) + ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^3) - (2*x1 - x2 + 2)/(x1/2 + x2/2 - 1)^2;
81
82 - h12 = (x1 - x2 + 2)/(2*(x1/2 + x2/2 - 1)^2) - 1/(x1/2 + x2/2 - 1) + 1/(4*ta*(x1/2 + x2/2 - 101/100)^2) + ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^3) - (2*x1 - x2 + 2)/(2*(x1/2 + x2/2 - 1)^2);
83
84 - h21 = (x1 - x2 + 2)/(2*(x1/2 + x2/2 - 1)^2) - 1/(x1/2 + x2/2 - 1) + 1/(4*ta*(x1/2 + x2/2 - 101/100)^2) + ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^3) - (2*x1 - x2 + 2)/(2*(x1/2 + x2/2 - 1)^2);
85
86 - h22 = 1/(x1/2 + x2/2 - 1) + (x1 - x2 + 2)/(x1/2 + x2/2 - 1)^2 + 1/(4*ta*(x1/2 + x2/2 - 101/100)^2) + ((x1 - x2/2 + 1)^2 + (x2/2 - 1)^2)/(2*(x1/2 + x2/2 - 1)^3);
87
88 - G = [g1; g2];
89 - H = [h11 h12; h21 h22];
90 - dk = -inv(H)*G;
91
92 if c'*dk <= 0
93     alpha = (de - c'*X - d)*(c'*dk)^(-1)*0.99;
94 else
95     alpha = 1;

```

```
96 — end
97 —
98 — ta = 10*ta;
99 — end
100 — disp('The solution point is');
101 — disp(X);
```

>> P411

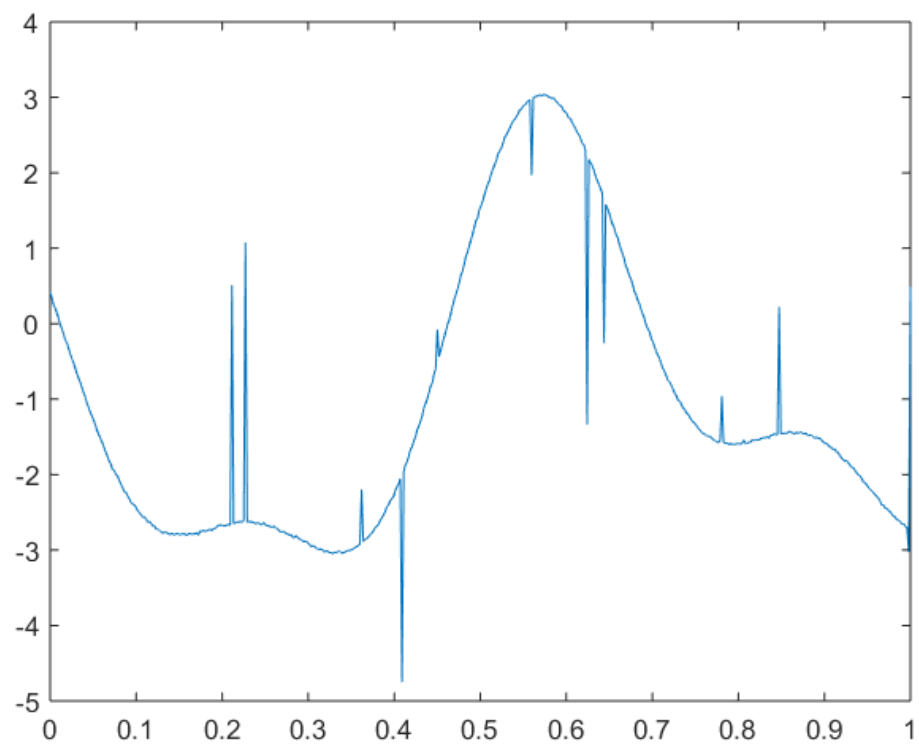
The solution point is

0.0080

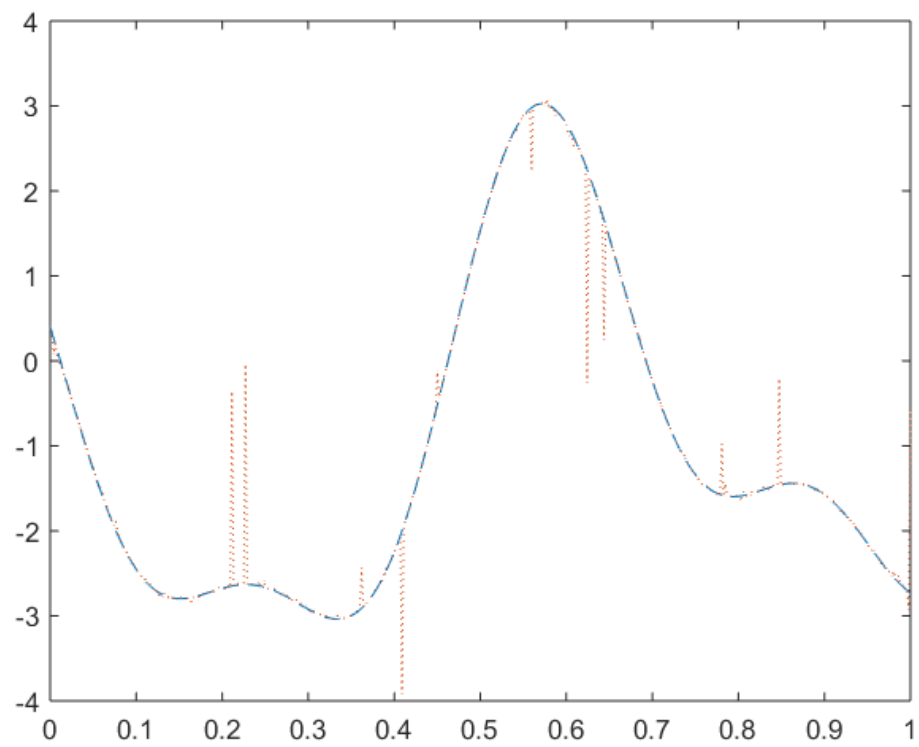
2.0120

P414

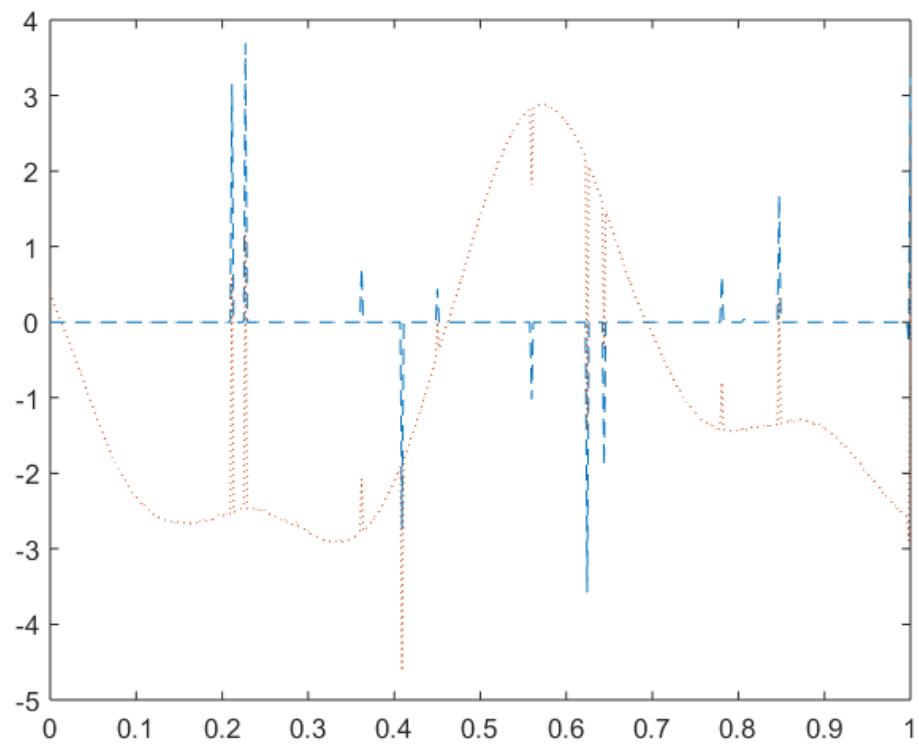
Generate a plot that displays the data curve u versus t



Generate a plot to show both x_1 and its estimate \hat{x}_1



Generate a plot to show both x_2 and its estimate \tilde{x}_2



Compute average 2-norm estimation errors with $n = 512$

```
>> P414
    0.2489

    1.9987

fx >>
```