繪圖軟體應用 第13周(12/4)

CH10 字串與數字處理

```
clear;clc
str = ['m' 'a' 't' 'l' 'a' 'b']
```

```
str =
'matlab'
```

```
ischar(str)
```

```
ans = logical
   1
```

ASCII

```
ascii = double(str) % str的位置碼
```

```
ascii = 1×6
   109    97   116   108    97    98
```

```
char(ascii) %把ascii碼轉換為字元
```

```
ans =
'matlab'
```

```
str2 = str + 10
```

```
str2 = 1×6
   119   107   126   118   107   108
```

```
str3 = '00011011'
```

```
str3 =
'00011011'
```

```
v = str3-48 %
```

```
v = 1×8
     0     0     0     1     1     0     1     1
```

```
double('0')
```

```
ans = 48
```

```
char(v+48)
```

```
ans =
'00011011'
```

```
whos
```

```
  Name       Size            Bytes  Class     Attributes

  ans        1x8                16  char
  ascii      1x6                48  double
```

```
  str         1x6                12  char
  str2        1x6                48  double
  str3        1x8                16  char
  v           1x8                64  double
```

```
str4 = '一個中文字佔兩個位元組'
```

```
str4 =
'一個中文字佔兩個位元組'
```

```
whos
```

```
  Name        Size             Bytes  Class     Attributes

  ans         1x8                 16  char
  ascii       1x6                 48  double
  str         1x6                 12  char
  str2        1x6                 48  double
  str3        1x8                 16  char
  str4        1x11                22  char
  v           1x8                 64  double
```

字串陣列

```
season = ['spring';'summer';'autumn';'winter']
```

```
season = 4×6 char array
    'spring'
    'summer'
    'autumn'
    'winter'
```

```
whos season
```

```
  Name        Size             Bytes  Class    Attributes

  season      4x6                 48  char
```

```
a = season(1:5)
```

```
a =
'ssawp'
```

```
month = ['January ';'February';'March   ']
```

```
month = 3×8 char array
    'January '
    'February'
    'March   '
```

```
str5 = deblank(month(3,:)) %去掉第三列後的空格字元
```

```
str5 =
'March'
```

```
whos s
```

字串處理函數

strcmp(str1,str2) 比較字串是否相等(邏輯)

strncmp(str1,str2,n) 比較str1和str2在第n個位置的字元是否相同

findstr(str,s)

strrep(str,s1,s2) 將字串str裡的s1替換成s2

strtok(str,token) 將字串str裡token字串後的字串刪除

strvcat(str1,str2) 將字串垂直排列

```
clear;clc
b1 = upper('Happy Xmas')
```

```
b1 =
'HAPPY XMAS'
```

```
b2 = strcmp('Hello','Kitty') %我們不一樣
```

```
b2 = logical
   0
```

```
findstr('matlab','t')
```

```
ans = 3
```

```
strtok(b1,'M')
```

```
ans =
'HAPPY X'
```

字串求值

```
eval('32+6') %可執行字串
```

```
ans = 38
```

```
eval(['x' '1' '=' 'sind(30)'])
```

```
x1 = 0.5000
```

用**for**來運用**eval( )**

```
for i=1:3
    eval(['sqrt' num2str(i) '=' 'sqrt(i)'])
end
```

```
sqrt1 = 1
sqrt2 = 1.4142
sqrt3 = 1.7321
```

字串與數值的轉換

int2str(x)

num2str(x)

num2str(x,n) 以n位數表示

mat2str2(x)

str2num(x)

```
clear;clc
int2str([12.3 52.8 49.6]) %四捨五入轉成整數
```

```
ans =
'12  53  50'
```

不同數字系統的轉換

dec2bin(x)

dec2bin(x,n)

dec2base(x,base)

base2dec(str,base)

```
c = dec2bin([23 56 15 49 72 61],8)
```

```
c = 6×8 char array
    '00010111'
    '00111000'
    '00001111'
    '00110001'
    '01001000'
    '00111101'
```

```
bin2dec(c)
```

```
ans = 6×1
    23
    56
    15
    49
    72
    61
```

```
reshape(bin2dec(c),2,3)
```

```
ans = 2×3
    23    15    72
    56    49    61
```

位元處理函數

```
%
```

CH11 其他資料型態

(結構structure、多質陣列**cell array)**

結構**(structure) :**

1. 結構名稱
2. 欄位名稱

```
clear;clc
% 建立結構student
% 結構名稱.欄位名稱
student.name = 'Tom';
student.id = 'A781035';
student.score = [11 13 9 11 11];
strct = student
```

```
strct = struct with fields:
     name: 'Tom'
       id: 'A781035'
    score: [11 13 9 11 11]
```

```
size(student)
```

```
ans = 1×2
     1     1
```

```
student(2).name = 'Jaden'; %第2位同學
student(2).id = 'B781035';
student(2).score = [15 15 15 15 15];
strct2 = student
```

strct2 = 1×2 struct

Fields	name	id	score
1	'Tom'	'A781035'	[11,13,...
2	'Jaden'	'B781035'	[15,15,...

s = struct('欄位1','值1','欄位2','值2')

```
student(3) = struct('name','Hannah','id','C781035',...
    'score',[15 14 10 13 12]);
strct3 = student
```

strct3 = 1×3 struct

Fields	name	id	score
1	'Tom'	'A781035'	[11,13,...
2	'Jaden'	'B781035'	[15,15,...
3	'Hannah'	'C781035'	[15,14,...

擷取

```
[student.name]
```

```
ans =
'TomJadenHannah'
```

```
[student.id]
```

```
ans =
'A781035B781035C781035'
```

```
[student.score]
```

```
ans = 1×15
    11    13     9    11    11    15    15    15    15    15    15    14    10 ···
```

```
cat(1,student.id) %一維方向合併ID
```

```
ans = 3×7 char array
    'A781035'
    'B781035'
    'C781035'
```

編修結構陣列的欄位

```
fieldnames(student) %查詢結構內的所有欄位
```

```
ans = 3×1 cell array
'name'
'id'
'score'
```

```
student2 = student;
student2(1).age = 19
```

```
student2 = 1×3 struct
```

Fields	name	id	score	age
1	'Tom'	'A781035'	[11,13,...	19
2	'Jaden'	'B781035'	[15,15,...	[ ]
3	'Hannah'	'C781035'	[15,14,...	[ ]

運算

```
st(1) = struct('name','Tom','score',[67 89]);
st(2) = struct('name','Jay','score',[74 92]);
isstruct(st) %查詢st是否為一個結構陣列
```

```
ans = logical
   1
```

```
isfield(st,'score') %結構陣列st是否有欄位score
```

```
ans = logical
   1
```

for :

```
if isstruct(st)
    avg=0;
    for i = 1:length(st)
        if avg < mean(st(i).score)
            avg = mean(st(i).score);
```

```
            num=i;
        end
    end
    fprintf('%s分數最高\n',st(num).name)
    fprintf('平均成績為%6.2f\n',avg)
else
    disp('st不是一個結構陣列')
end
```

Cell Array

```
clear;clc
A = {'abc',1234,magic(3)}
```

A = 1×3 cell

	1	2	3
1	'abc'	1234	[8,1,6;...

```
sizeA = size(A)
```

```
sizeA = 1×2
     1     3
```

```
C = repmat(A,3,1) %重複多質陣列A
```

C = 3×3 cell

	1	2	3
1	'abc'	1234	[8,1,6;...
2	'abc'	1234	[8,1,6;...
3	'abc'	1234	[8,1,6;...

```
D{1,1} = 'cde';
D{1,2} = 5678;
D{1,3} = magic(4);
D
```

D = 1×3 cell

	1	2	3
1	'cde'	5678	4×4 double

CH13 曲線擬合與插值法

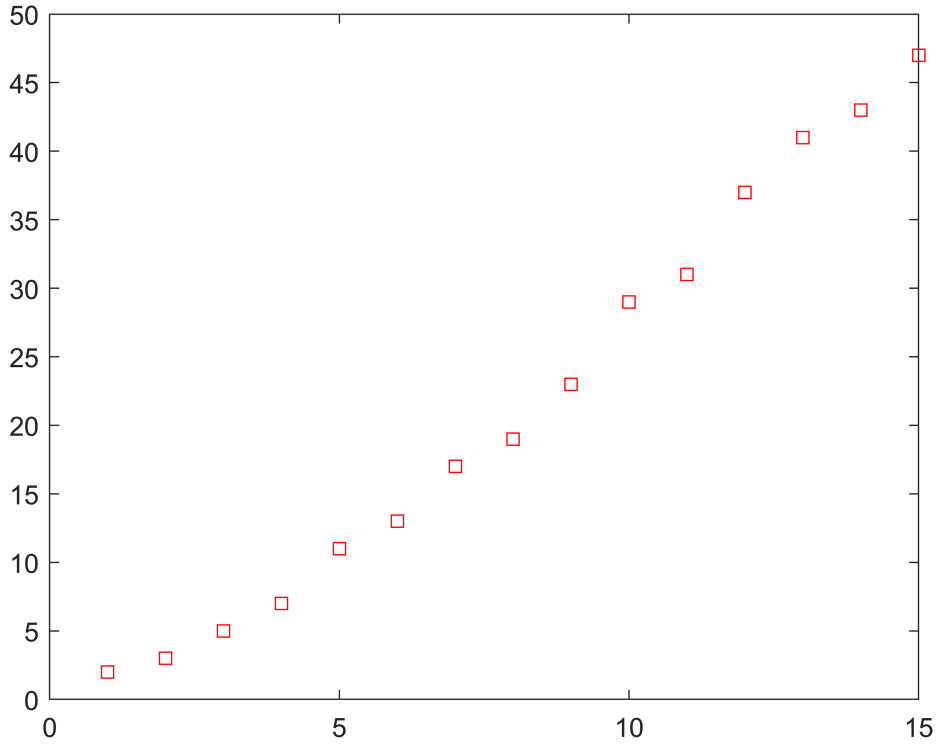
曲線擬合：最小平方法

polyfit(x,y,n) 以x、y向量進行n階多項式擬合，回應一個列向量

polyval(p,a)

```
clear;clc
%以多項式來擬合小於50的質數所組成的資料點
```

```
y = primes(50);
x = 1:length(y);
plot(x,y,'Sr')
```



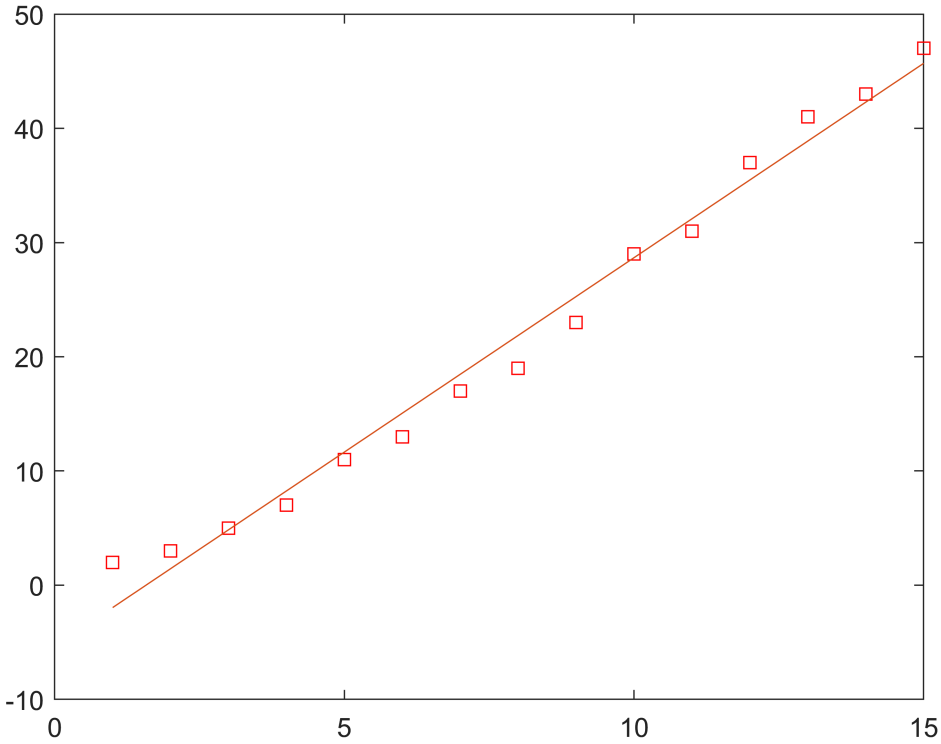

```
pl = polyfit(x,y,1) % 擬合結果 : 3.4036x - 5.3619
```

```
pl = 1×2
    3.4036   -5.3619
```

```
fl = polyval(pl,x) %計算多項式pl(x)的值
```

```
fl = 1×15
   -1.9583    1.4452    4.8488    8.2524   11.6560   15.0595   18.4631   21.8667 ···
```

```
plot(x,y,'sr',x,fl,'-')
```



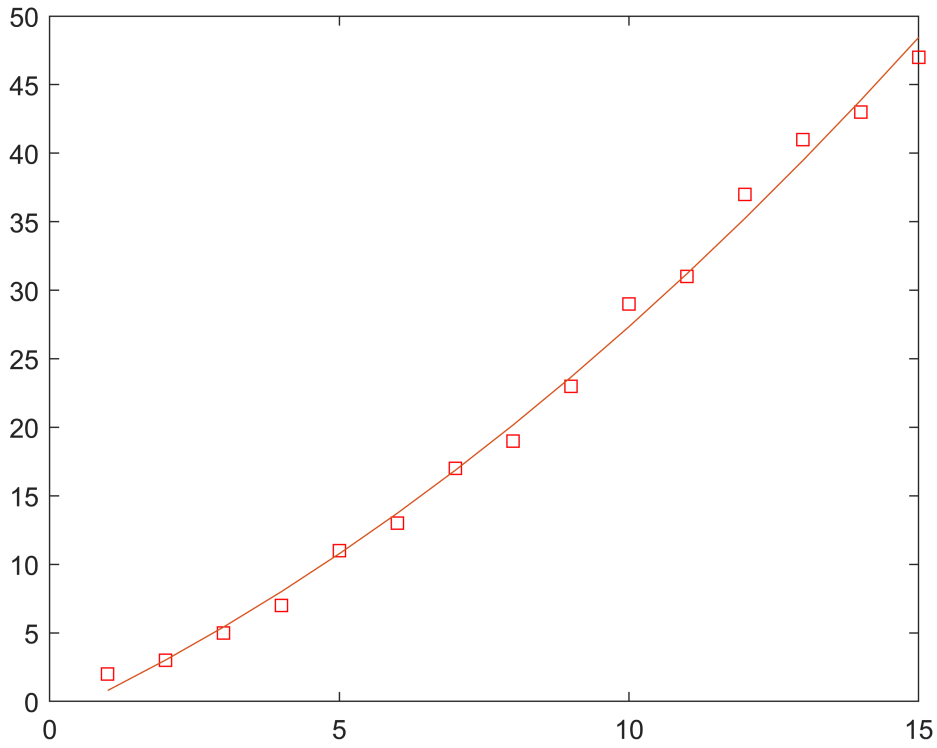

```
p2 = polyfit(x,y,2) %二階多項式擬合結果:
```

```
p2 = 1×3
    0.0907    1.9517   -1.2484
```

```
f2 = polyval(p2,x)
```

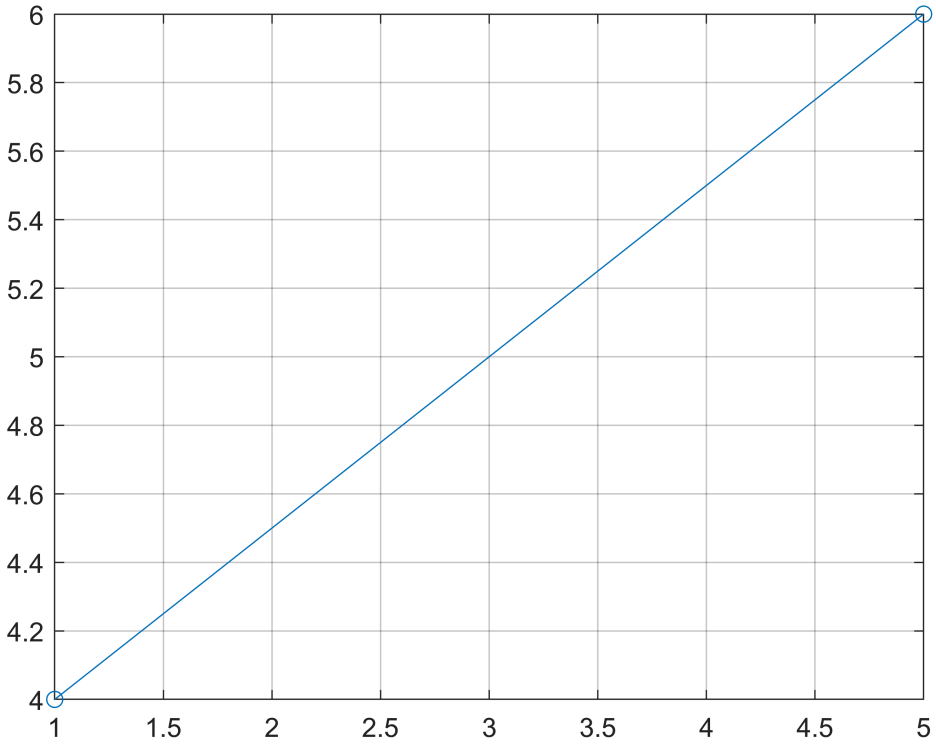
```
f2 = 1×15
    0.7941    3.0181    5.4235    8.0104   10.7788   13.7287   16.8600   20.1729 ···
```

```
plot(x,y,'sr',x,f2,'-')
```



一維插值法**(interpolation) : interp1**

```
clear;clc
plot([1 5],[4 6],'-o');grid on
```



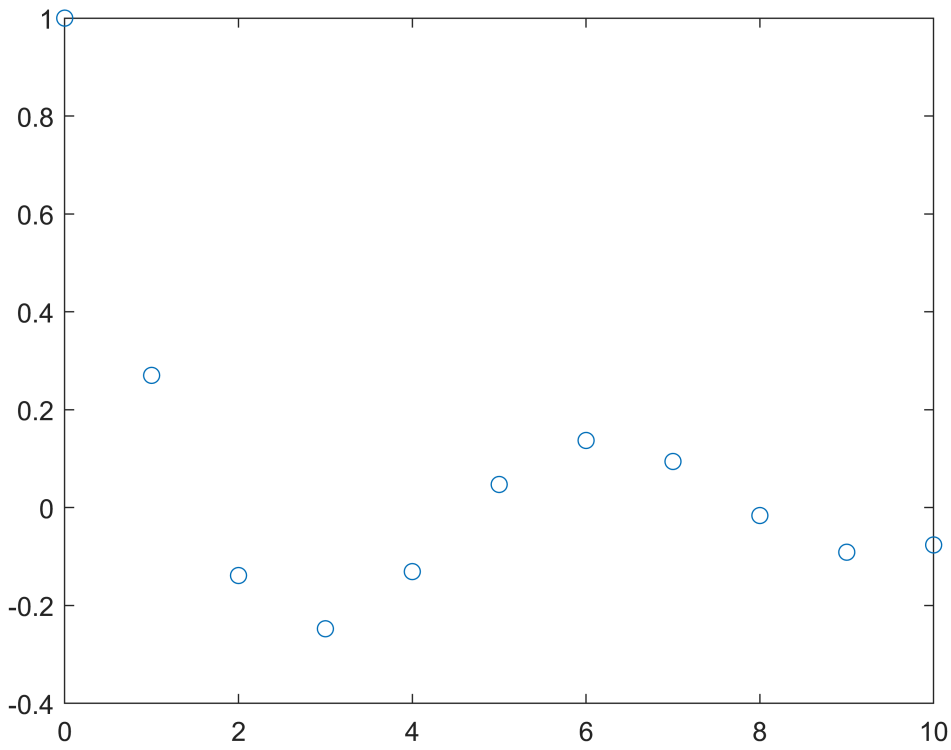

```
interp1([1 5],[4 6],2,'nearest')
```

```
ans = 4
```

```
%以鄰近點插值法求解在x=2時的內插值
interp1([1 5],[4 6],2,'linear')
```

```
ans = 4.5000
```

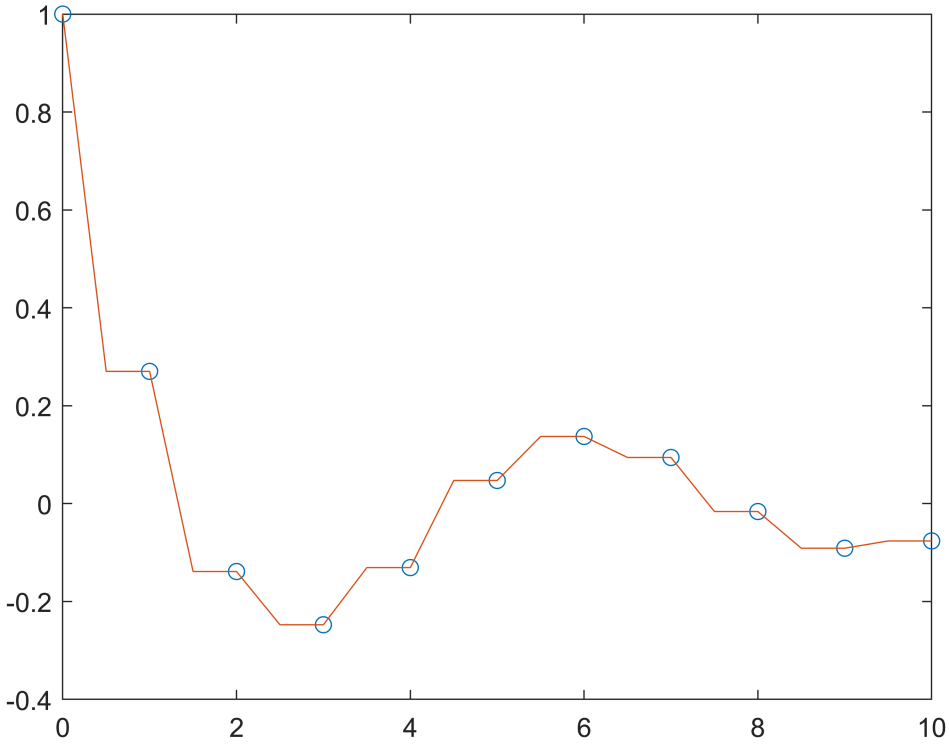
```
%以線性插值法求解在x=2時的內插值

x= 0:10;
y= cos(x)./(1+x);
plot(x,y,'o')
```




```
x1 = 0:0.5:10;
y0 = interp1(x,y,x1,'nearest')
```

```
y0 = 1×21
    1.0000    0.2702    0.2702   -0.1387   -0.1387   -0.2475   -0.2475   -0.1307 ···
```

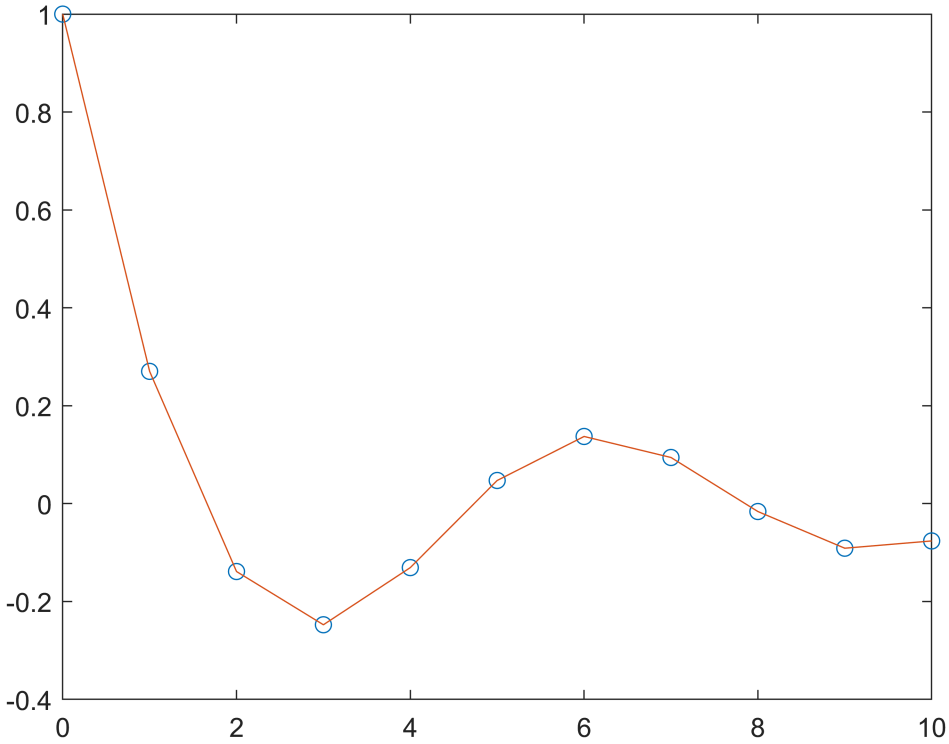
```
plot(x,y,'o',x1,y0,'-')
```




```
y1 = interp1(x,y,x1,'linear')
```

```
y1 = 1×21
    1.0000    0.6351    0.2702    0.0657   -0.1387   -0.1931   -0.2475   -0.1891 ···
```

```
plot(x,y,'o',x1,y1,'-')
```



二維插值法: **interp2**

```

```

二維的散佈點內插: **griddata**

使用時機：二維資料點並不是剛好位於網格點上面

```

```

CH17 檔案處理

寫入與寫出工作區內的變數

```
clear;clc
% 建立結構student
% 結構名稱.欄位名稱
student.name = 'Tom';
student.id = 'A781035';
student.score = [11 13 9 11 11];
strct = student
```

```
strct = struct with fields:
     name: 'Tom'
       id: 'A781035'
    score: [11 13 9 11 11]
```

```
size(student);
```

```
save tt2 student %把student存為tt2.mat

load tt2.mat
whos
```

```
  Name         Size            Bytes  Class     Attributes

  ans          1x2                16  double
  strct        1x1               588  struct
  student      1x1               588  struct
```

```
score = student.score
```

```
score = 1×5
    11    13     9    11    11
```

```
save tt2.dat score -ascii %把score存為ascii檔案tt2.dat
```

以逗號隔開**(CSV)**

```
clear;clc
```

以特定符號隔開**(dlm)**

```

```