繪圖軟體應用 第12周(11/27)

第9章 程式流程控制

邏輯陣列

```
clear;clc
test=[1 3 5] > [4 2 6]
```

```
test = 1×3 logical array
   0   1   0
```

```
whos
```

```
  Name      Size            Bytes  Class              Attributes

  g         1x1                32  function_handle
  gs50      1x1                 8  double
  test      1x3                 3  logical
```

```
a=[-1 2 0 3 1 5]
```

```
a = 1×6
    -1     2     0     3     1     5
```

```
a(logical([1 0 1 1 0 1]))
```

```
ans = 1×4
    -1     0     3     5
```

find(array) %找出不為0的元素

```
a=[1 5 0 6;4 0 1 9;3 7 8 0]
```

```
a = 3×4
     1     5     0     6
     4     0     1     9
     3     7     8     0
```

```
find(a)
```

```
ans = 9×1
     1
     2
     3
     4
     6
     8
     9
    10
    11
```

```
[r,c] = find(a>=6)
```

```
r = 4×1
     3
```

```
     3
     1
     2
c = 4×1
     2
     3
     4
     4
```

邏輯運算子

& 且(and)

| 或(or)

~ 非(not)

all() 元素皆非0時為真

any() 所有元素有一個非0時為真

```
clear;clc
a1=[0 5 4;0 0 8;0 0 1]
```

```
a1 = 3×3
     0     5     4
     0     0     8
     0     0     1
```

```
all(a1)
```

```
ans = 1×3 logical array
   0   0   1
```

```
all(all(a1))
```

```
ans = logical
   0
```

```
any(a1)
```

```
ans = 1×3 logical array
   0   1   1
```

選擇性敘述

```
clear;clc
num = 5
```

```
num = 5
```

```
%如果輸入浮點數 3.6 會顯示3.6是奇數
if mod(num,2)==0
    fprintf('%g是偶數\n',num)
else
    fprintf('%g是奇數\n',num)
end
```

```
5是奇數
```

```
%------------------------------------------------------------
num2 = 60.8
```

```
num2 = 60.8000
```

```
%如果輸入浮點數 3.6 不會顯示
if num2-fix(num2)==0 & num>0 %限制num2是正整數
    if mod(num2,2)==0
        fprintf('%g是偶數\n',num2)
    else
        fprintf('%g是奇數\n',num2)
    end
else
    fprintf('麥亂，%g不是正整數',num2)
end
```

```
麥亂，60.8不是正整數
```

switch-case-otherwise

```
```

for 迴圈

```
clear;clc
```

whilie 迴圈

```
clear;clc
%質數加總
total = 0;
num=2;
cnt=0;
while cnt < 100
    if isprime(num)
        total=total+num;
        cnt = cnt+1;
        fprintf('%3d: prime=%3d ,sum=%5d\n',cnt,num,total)
    end
    num=num+1;
end
```

```
  1: prime=  2 ,sum=    2
  2: prime=  3 ,sum=    5
  3: prime=  5 ,sum=   10
  4: prime=  7 ,sum=   17
  5: prime= 11 ,sum=   28
  6: prime= 13 ,sum=   41
  7: prime= 17 ,sum=   58
  8: prime= 19 ,sum=   77
  9: prime= 23 ,sum=  100
 10: prime= 29 ,sum=  129
 11: prime= 31 ,sum=  160
 12: prime= 37 ,sum=  197
```

```
13: prime= 41 ,sum=  238
14: prime= 43 ,sum=  281
15: prime= 47 ,sum=  328
16: prime= 53 ,sum=  381
17: prime= 59 ,sum=  440
18: prime= 61 ,sum=  501
19: prime= 67 ,sum=  568
20: prime= 71 ,sum=  639
21: prime= 73 ,sum=  712
22: prime= 79 ,sum=  791
23: prime= 83 ,sum=  874
24: prime= 89 ,sum=  963
25: prime= 97 ,sum= 1060
26: prime=101 ,sum= 1161
27: prime=103 ,sum= 1264
28: prime=107 ,sum= 1371
29: prime=109 ,sum= 1480
30: prime=113 ,sum= 1593
31: prime=127 ,sum= 1720
32: prime=131 ,sum= 1851
33: prime=137 ,sum= 1988
34: prime=139 ,sum= 2127
35: prime=149 ,sum= 2276
36: prime=151 ,sum= 2427
37: prime=157 ,sum= 2584
38: prime=163 ,sum= 2747
39: prime=167 ,sum= 2914
40: prime=173 ,sum= 3087
41: prime=179 ,sum= 3266
42: prime=181 ,sum= 3447
43: prime=191 ,sum= 3638
44: prime=193 ,sum= 3831
45: prime=197 ,sum= 4028
46: prime=199 ,sum= 4227
47: prime=211 ,sum= 4438
48: prime=223 ,sum= 4661
49: prime=227 ,sum= 4888
50: prime=229 ,sum= 5117
51: prime=233 ,sum= 5350
52: prime=239 ,sum= 5589
53: prime=241 ,sum= 5830
54: prime=251 ,sum= 6081
55: prime=257 ,sum= 6338
56: prime=263 ,sum= 6601
57: prime=269 ,sum= 6870
58: prime=271 ,sum= 7141
59: prime=277 ,sum= 7418
60: prime=281 ,sum= 7699
61: prime=283 ,sum= 7982
62: prime=293 ,sum= 8275
63: prime=307 ,sum= 8582
64: prime=311 ,sum= 8893
65: prime=313 ,sum= 9206
66: prime=317 ,sum= 9523
67: prime=331 ,sum= 9854
68: prime=337 ,sum=10191
69: prime=347 ,sum=10538
70: prime=349 ,sum=10887
71: prime=353 ,sum=11240
72: prime=359 ,sum=11599
73: prime=367 ,sum=11966
74: prime=373 ,sum=12339
75: prime=379 ,sum=12718
76: prime=383 ,sum=13101
77: prime=389 ,sum=13490
```

```
 78: prime=397 ,sum=13887
 79: prime=401 ,sum=14288
 80: prime=409 ,sum=14697
 81: prime=419 ,sum=15116
 82: prime=421 ,sum=15537
 83: prime=431 ,sum=15968
 84: prime=433 ,sum=16401
 85: prime=439 ,sum=16840
 86: prime=443 ,sum=17283
 87: prime=449 ,sum=17732
 88: prime=457 ,sum=18189
 89: prime=461 ,sum=18650
 90: prime=463 ,sum=19113
 91: prime=467 ,sum=19580
 92: prime=479 ,sum=20059
 93: prime=487 ,sum=20546
 94: prime=491 ,sum=21037
 95: prime=499 ,sum=21536
 96: prime=503 ,sum=22039
 97: prime=509 ,sum=22548
 98: prime=521 ,sum=23069
 99: prime=523 ,sum=23592
100: prime=541 ,sum=24133
```

break : 離開迴圈

```
clear;clc
tic
num=1000;
while 1
    if isprime(num) %如果num是質數
        break
    else
        num=num+1;
    end
end
fprintf('大於1000的最小質數為 %3d\n',num)
```

```
大於1000的最小質數為 1009
```

```
toc
```

```
Elapsed time is 0.011619 seconds.
```

continue : 停止執行剩餘的迴圈主體

```
clear;clc
tic
for num=1:20
    if isprime(num) %如果num是質數
        continue
    end
    fprintf('%3d',num)
end
```

```
  1  4  6  8  9 10 12 14 15 16 18 20
```

```
toc
```

```
Elapsed time is 0.017596 seconds.
```

迴圈向量化：節省時間

```
clear;clc
n=1:100
```

```
n = 1×100
     1     2     3     4     5     6     7     8     9    10    11    12    13 ···
```

```
tic
total = sum(1./(1+n.^2))
```

```
total = 1.0667
```

```
toc %快
```

```
Elapsed time is 0.006926 seconds.
```