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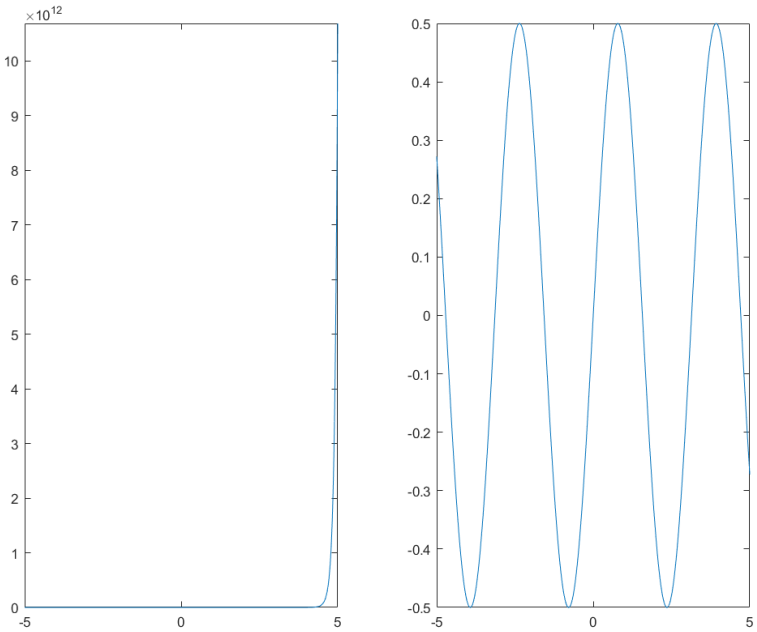
PART 1 Simple Introdution

(10 points)1. $y = e^{x+x^2}$ and $y = \sin(x)\cos(x)$,x is from -5 to 5. Please plot the figure in a **1*2** figure .(Hint: use *subplot.* Both numerical method and symbolic method is ok)

定义$y = e^{x+x^2}$ 和 $y = \sin(x)\cos(x)$，x 的定义域为[-5.5]，并在在 **1*2** 的图中画出两个函数。（提示：使用 *subplot* 来画 1*2 的图。数值法和符号法都可行）

```
clear;clf;
syms x;
y1 = exp(x+x^2);
y2 = sin(x)*cos(x);
subplot(1,2,1);fplot(y1,[-5,5])
subplot(1,2,2);fplot(y2,[-5,5])
```



(8 points)2. Let a =17.2, b = 4. Please calculate the following formulas and **show** the results.

令 a =17.2, b = 4。 请计算出 c 与 d 的值并展示出结果。

$$c = \sqrt[3]{a + 9.8}$$

$$d = 100 \cdot \sqrt{5b + 16}$$

```
clear;clf;
a = 17.2;
b = 4;
c = (a + 9.8)^(1/3);
d = 100*(5*b + 16)^(1/2);
disp(c);disp(d);
```

```
      3

    600
```

(10 points)3. Please solve the following equations.

请求解以下方程组

$$\begin{cases} 3x + 2y - z = 10 \\ -x + 3y + 2z = 5 \\ x - y - z = -1 \end{cases}$$

a. changing to the matrix form.

用矩阵表示该方程组系数

b. using matrix operation to solve. (**Hint**:use A/B or A\B)

请使用矩阵方法求解该方程组

```
clear;clf;
A = [3 2 -1;-1 3 2;1 -1 -1];
B = [10;5;-1];
x = A\B;
disp(A);disp(B);disp(x);
```

```
     3     2    -1
    -1     3     2
     1    -1    -1

    10
     5
    -1

   -2.0000
    5.0000
   -6.0000
```

(12 points) 4. Find the prime number between 1 and 100 **by using loop and branching**. (*primes* is not allowed)

找到 1 到 100 之间的质数并显示结果。（函数 *primes* 不被允许使用）

```
clear;clf;
for i = 2 : 100
    for j = 2 : 10
        if (~mod(i,j))
            break
        end
    end
    if (j > (i/j))
        disp(i)
    end
end
```

```
     2
     3
     5
     7
    11
    13
    17
    19
    23
    29
    31
    37
    41
    43
    47
    53
    59
    61
    67
    71
    73
    79
```

83

89

97

PART 2 File Loading and Analysis

(24 points)5. Fetching external data(Do not change the value you obtain)

外部数据获取（不要修改获取的数据的值）

a. Load file Array.mat, display vector and matrix

读入 Array.mat，并显示其中的两个变量 vector 及 matrix

b. Assign the 3rd, 6th, 9th, and 12th digits to a vectorA and display vectorA

将 vector 中第 3、6、9、12 个数赋给 vectorA，并显示结果

c. Assign vector to the vectorB, change the 4th number in the vectorB to 12, and display vectorB

将 vector 赋值给 vectorB，将 vectorB 中的第 4 个数修改为 12 后显示结果

d. Assign rows 5, 6, and 7 of matrix to matrixA and display matrixA

将 matrix 的第 5，6，7 行赋予 matrixA，并显示结果

e. Assign rows 1,2, and 2,3 of matrix to a matrixB and display matrixB

将 matrix 的第 1，2 行及第 2，3 列赋予 matrixB，并显示结果

f. Find the location of a value less than 3 in the matrix

找出 matrix 中小于 3 的值的位置

```
clear;clf;
load("src\Array.mat");
disp(vector);disp(matrix);
```

```
 4    -4     3    -3     2     2    -1     0    -4     4     0     5

-1     2    -4     5     4
-2    -3     4    -2    -3
 3     3     5    -4    -2
-4     3     1    -1    -4
 3    -3     3     1    -5
 4     3     2    -5     5
 0    -5     4     5    -4
-3     4    -2     2    -4
 1    -1     0     2     4
 0     2    -4     0     4
```

```
vectorA = [vector(3),vector(6),vector(9),vector(12)];
disp(vectorA);
```

```
 3     2    -4     5
```

```
vectorB = vector(1,:);vectorB(4) = 12;
disp(vectorB);
```

```
 4    -4     3    12     2     2    -1     0    -4     4     0     5
```

```
matrixA = [matrix(5,:);matrix(6,:);matrix(7,:)];
disp(matrixA);
```

```
 3    -3     3     1    -5
 4     3     2    -5     5
 0    -5     4     5    -4
```

```
matrixB = matrix([1,2],[2,3]);
disp(matrixB);
```

```
 2    -4
-3     4
```

```
disp(find(matrix<3));
```

```
 1
 2
 4
 7
 8
 9
10
11
12
15
17
19
20
21
24
26
28
29
30
```

```
32
33
34
35
36
38
39
40
42
43
44
45
47
48
```

(24 points)6. Load *data.xlsx*， fix the data table and display (Hint: *readtable/importdata* may be helpful)

读入 excel 数据，补全数据表(计算第三列)并输出

output formal example:

	月份	销售额...	占总产...
1	'1月'	100	NaN
2	'2月'	520	NaN
3	'3月'	800	NaN
4	'4月'	1500	NaN
5	'5月'	1320	NaN
6	'6月'	1100	NaN
7	'7月'	875	NaN
8	'8月'	987	NaN
9	'9月'	652	NaN

```
'月份'      '销售额（…   '占总产值…
'1月'       '  100'     '0.85295%'
'2月'       '  520'     '4.4353%'
'3月'       '  800'     '6.8236%'
'4月'       ' 1500'     '12.7943%'
'5月'       ' 1320'     '11.259%'
'6月'       ' 1100'     '9.3825%'
'7月'       '  875'     '7.4633%'
'8月'       '  987'     '8.4186%'
'9月'       '  652'     '5.5612%'
```

```
clear;clf;
A = readtable("src\data.xlsx","VariableNamingRule","preserve")
```

A = 13×3 table

	月份	销售额（万元）	占总产值百分比
1	'1 月'	100	NaN
2	'2 月'	520	NaN
3	'3 月'	800	NaN
4	'4 月'	1500	NaN
5	'5 月'	1320	NaN
6	'6 月'	1100	NaN
7	'7 月'	875	NaN
8	'8 月'	987	NaN
9	'9 月'	652	NaN
10	'10 月'	1300	NaN
11	'11 月'	1600	NaN
12	'12 月'	970	NaN
13	'销售总额： '	11724	NaN

```
all = A.("销售额（万元）")(13);
A.("占总产值百分比") = num2str(A.("销售额（万元）") / all * 100) + "%";
disp(A)
```

```
      月份          销售额（万元）    占总产值百分比
    ____________    ____________    ____________

    {'1 月'      }        100        "0.8529512%"
    {'2 月'      }        520        " 4.435346%"
    {'3 月'      }        800        "  6.82361%"
    {'4 月'      }       1500        " 12.79427%"
    {'5 月'      }       1320        " 11.25896%"
    {'6 月'      }       1100        " 9.382463%"
    {'7 月'      }        875        " 7.463323%"
    {'8 月'      }        987        " 8.418628%"
    {'9 月'      }        652        " 5.561242%"
    {'10 月'     }       1300        " 11.08837%"
    {'11 月'     }       1600        " 13.64722%"
    {'12 月'     }        970        " 8.273627%"
    {'销售总额： '}      11724        "      100%"
```

(16 points)7.

a.load *picture.jpg* and display this picture

加载图片文件（*picture.jpg*）并显示

```
clear;clf;
A = imread("src\picture.jpg");
imshow(A);
```

b. load *TheySay.mp3*, sound and display sampling frequency. (Hint:What is the sampling frequency? Search on the Internet)

载入声音文件（*TheySay.mp3*），播放并输出采样频率

```
clear;clf;
[audio,Fs] = audioread("src\TheySay.mp3");
sound(audio,Fs);
disp(Fs)
```

```
        44100
```