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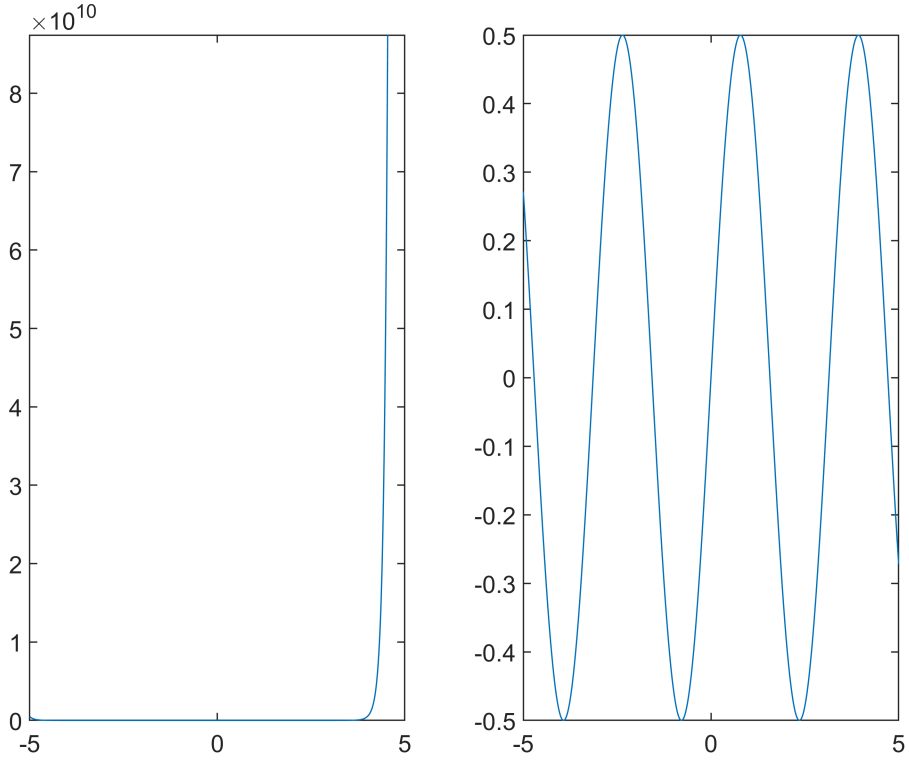
## PART 1 Simple Introdution

(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）

```
syms x;
e = exp(1);
y = e^(x+x*x);
subplot(1,2,1);fplot(y,[-5,5]);
syms a;
y = sin(x)*cos(x);
subplot(1,2,2);fplot(x,y)
```



(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。

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

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

```
a = 17.2;
c = (a + 9.8)^(1/3)
```

```
c = 3
```

```
b = 4;
d = 100*(5*b+16)^(1/2)
```

```
d = 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

```
A = [3,2,-1;
    -1,3,2;
    1,-1,-1] ;
B = [10;
    5;
    -1];
ans = A\B
```

```
ans = 3×1
   -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)

```
list = [];
```

```
for i = 1:1:100
    i1 = i/2;
    i2 = i/3;
    i3 = i/5;
    i4 = i/7;
    if i == 1
        a = 1;
    elseif i < 10
        if i == 2 || i == 3 || i == 5 || i == 7
            list = [list,i];
        end
    elseif i >= 10
        if fix(i1) ~= i1 && fix(i2) ~= i2 && fix(i3) ~= i3 && fix(i4) ~= i4
            list = [list,i];
        end
    end
end
list
```

```
list = 1×25
     2     3     5     7    11    13    17    19    23    29    31    37    41 ···
```

## 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

```
load("Array.mat")
vectorA = [];
vectorA = vector(3:3:12)
```

```
vectorA = 1×4
     3     2    -4     5
```

```
vectorB = vector;
vectorB(4) = 12
```

```
vectorB = 1×12
     4    -4     3    12     2     2    -1     0    -4     4     0     5
```

```
vectorA = matrix(5:7,:)
```

```
vectorA = 3×5
     3    -3     3     1    -5
     4     3     2    -5     5
     0    -5     4     5    -4
```

```
vectorB = matrix([1:2],[2:3])
```

```
vectorB = 2×2
     2    -4
    -3     4
```

```
location = [];
for x = [1:10]
    for y = [1:5]
        if matrix(x,y) < 3
            location = [location;[x,y]];
        elseif matrix(x,y) >= 3
            continue
        end
    end
end
location
```

```
location = 33×2
     1     1
     1     2
     1     3
     2     1
     2     2
     2     4
     2     5
     3     4
     3     5
     4     1
     ⋮
```

(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%'
```

```
table = readtable("data.xlsx","VariableNamingRule","preserve");
for x = 1:13
    table.("占总产值百分比")(x) = table.("销售额（万元）")(x)/table.("销售额（万元）")(13);
end
table
```

table = 13×3 table

| | 月份 | 销售额（万元） | 占总产值百分比 |
|---|---|---|---|
| 1 | '1月' | 100 | 0.0085 |
| 2 | '2月' | 520 | 0.0444 |
| 3 | '3月' | 800 | 0.0682 |
| 4 | '4月' | 1500 | 0.1279 |
| 5 | '5月' | 1320 | 0.1126 |
| 6 | '6月' | 1100 | 0.0938 |
| 7 | '7月' | 875 | 0.0746 |
| 8 | '8月' | 987 | 0.0842 |
| 9 | '9月' | 652 | 0.0556 |
| 10 | '10月' | 1300 | 0.1109 |
| 11 | '11月' | 1600 | 0.1365 |
| 12 | '12月' | 970 | 0.0827 |
| 13 | '销售总额：' | 11724 | 1.0000 |

(16 points)7.

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

加载图片文件（*picture.jpg*）并显示

```
clf;
a = imread('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

```
[y,Fs] = audioread('TheySay.mp3');
sound(y,Fs)
Fs
```

```
Fs = 44100
```