Matlab 科学计算

语言及应用

21221 学期

第 1 次

实验报告

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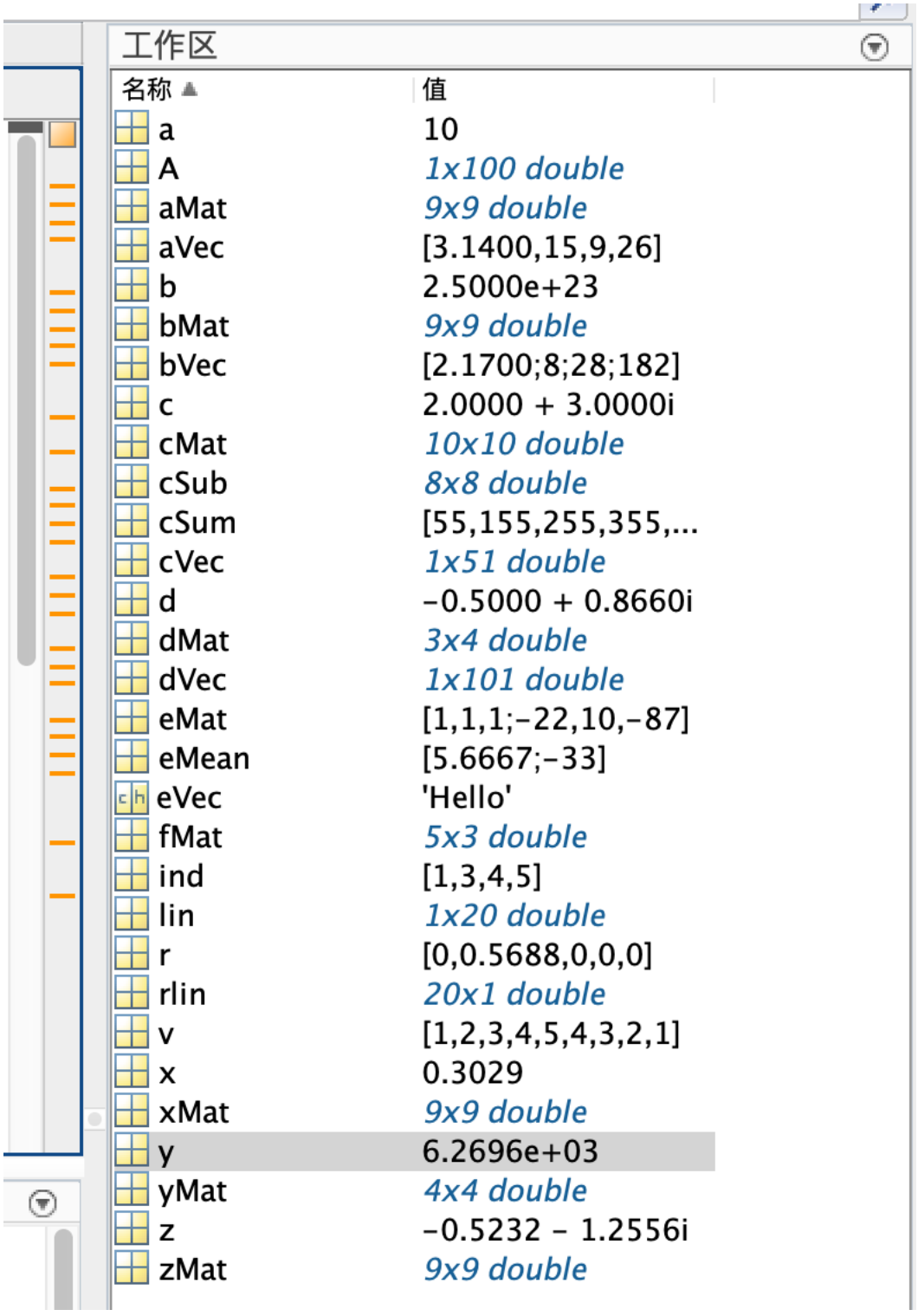
题目：1、2、3、4、5、6

代码：

```
clear; clc;
a = 10
b = 2.5*10^23
c = 2 + 3i
d = exp((2*pi/3)*1i)


aVec = [3.14 15 9 26]
bVec = [2.17; 8; 28; 182]
cVec = 5: -0.2 : -5
dVec = logspace(0,1,101)
eVec = 'Hello'


aMat = 2*ones(9,9)
v = [1 2 3 4 5 4 3 2 1];
bMat = diag(v)
A = 1:100;
cMat = reshape(A,[10,10])
dMat = nan(3,4)
eMat = [13 -1 5;-22 10 -87]
fMat = randi([-3,3],5,3)

x = 1/(1 + exp(-((a-15)/6)))
y = (a^(1/2) + b^(1/21))^pi
z = log(real((c+d)*(c-d))*sin(a*pi/3))/c*c'

xMat = (aVec*bVec)*(aMat)^2
yMat = (bVec*aVec)
zMat = det(cMat)*(aMat*bMat).'

cSum =  sum(cMat)
eMean = mean(eMat,2)
eMat(1,:) = [1 1 1]
cSub = cMat(2:9,2:9)
lin = 1:20;
rlin = ones(20,1);
rlin(2:2:end) = -1;
lin = lin.*rlin'
r = rand(1,5);
```

```
ind = find(r<0.5);
r(ind) = 0
```

实验结果及分析：



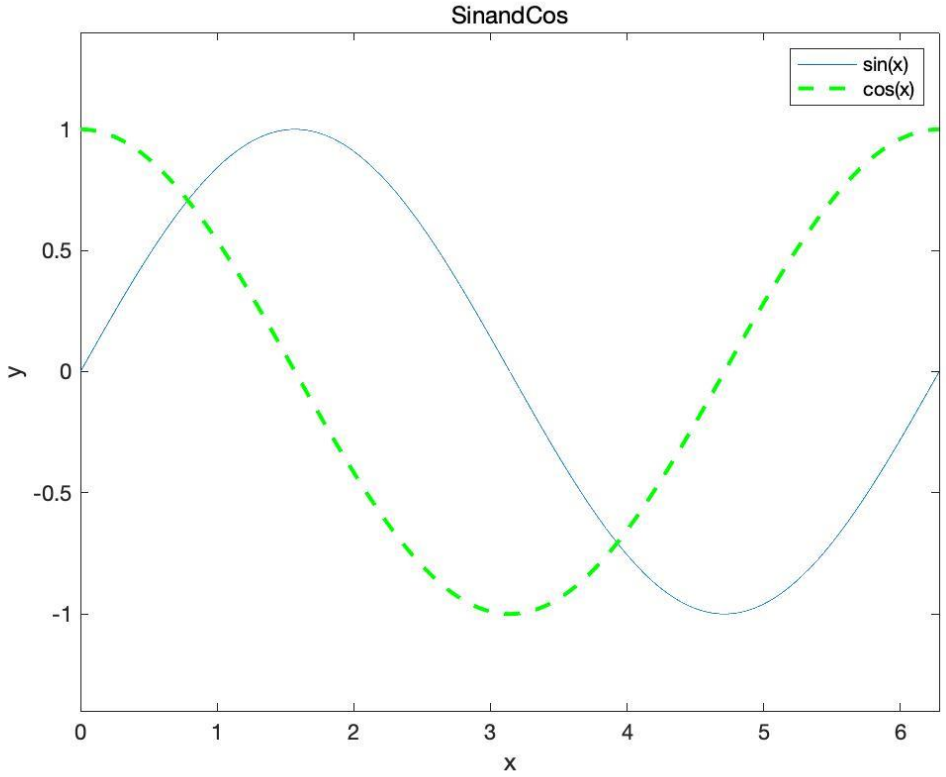
实验数据正常

题目：7

代码：

```
clear; clc;
figure
t = linspace(0,2*pi,100000);
plot(t,sin(t));
hold on
plot(t,cos(t),'g--','LineWidth',2);
xlabel('x')
ylabel('y')
title('SinandCos')
legend('sin(x)','cos(x)')
xlim([0 2*pi])
ylim([-1.4 1.4])
```

实验结果及分析：



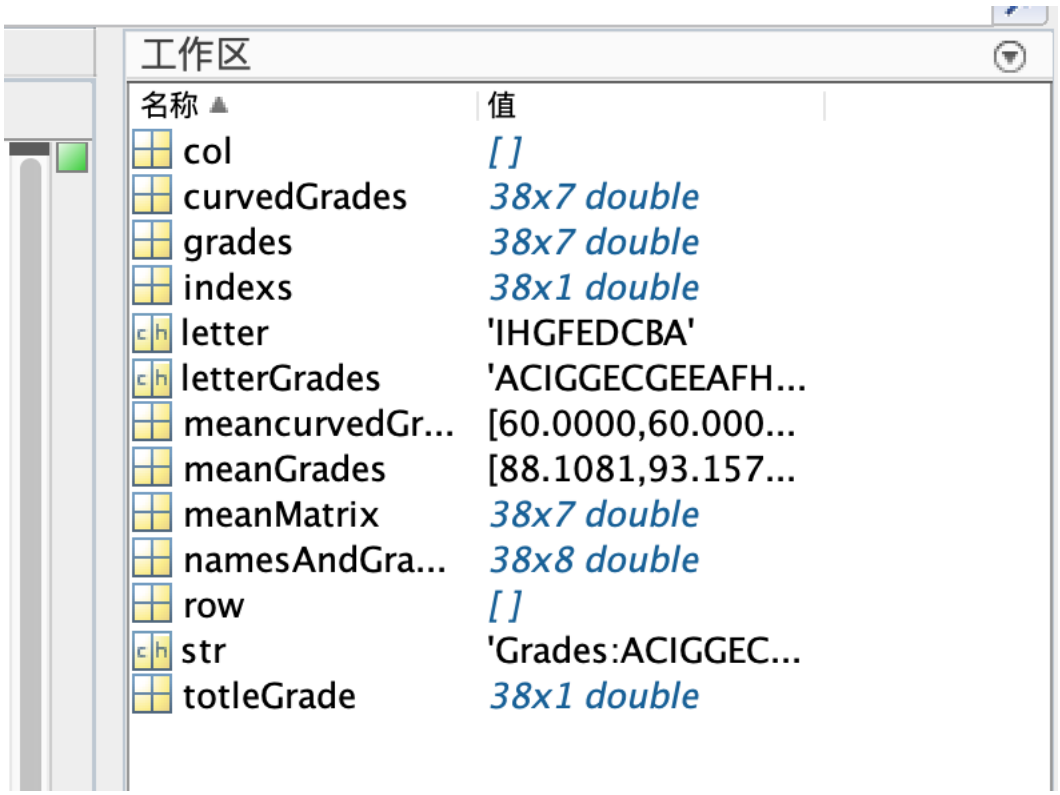
实验数据正常，函数图像良好。

题目：8

代码：

```
clear; clc;
load classGrades
disp(namesAndGrades(1:5,:))
grades = namesAndGrades(:,2:end);
meanGrades = nanmean(grades);
meanMatrix = ones(38,1)*meanGrades;
curvedGrades = 60*(grades./meanMatrix);
meancurvedGrades = nanmean(curvedGrades);
disp(meancurvedGrades)
[row,col] = find(curvedGrades>100);
curvedGrades(row,col) = 100;
totleGrade = ceil(nanmean(curvedGrades,2));
letter = 'IHGFEDCBA';
indexs = totleGrade-min(totleGrade) + 1;
letterGrades(1:38) = letter(indexs);
str = ['Grades:',letterGrades];
disp(str)
```

实验结果及分析：



```
命令行窗口
     1    85   100   100   100   100    95    95
     2    85    85    95   100   100    90   100
     3    85    85    80    85    90    80    90
     4    85    90    90    90    90    85    85
     5    80    80    85   100    95    80    95

   60.0000   60.0000   60.0000   60.0000   60.0000   60.0000   60.0000

Grades:ACIGGECGEEAFHFABECEABHFCDGEFEBAEEGCBBG
fx >>
```

实验数据正常，没有出现换算后超出 100 分的情况，但仍做了处理。

题目：9

代码：

```
clear;
ballHight = 1.5;
G = 9.8;
velocityOfBall = 4;
Angle = 45;
t = linspace(0,1,1000);
x = velocityOfBall*cos(Angle*pi/180)*t;
y = ballHight + velocityOfBall*cos(Angle*pi/180)*t - (1/2)*G*t.^2;
ind = find(y<0,1);
xGround = x(ind);
str = ['The ball hits the ground at a distance of ' num2str(xGround)
'meters.'];
disp(str)
figure
plot(x, y)
xlabel('height');
ylabel('distance');
hold on
z = zeros(1,1000);
plot(x,z,'k--')
xlim([0 max(x)])
```

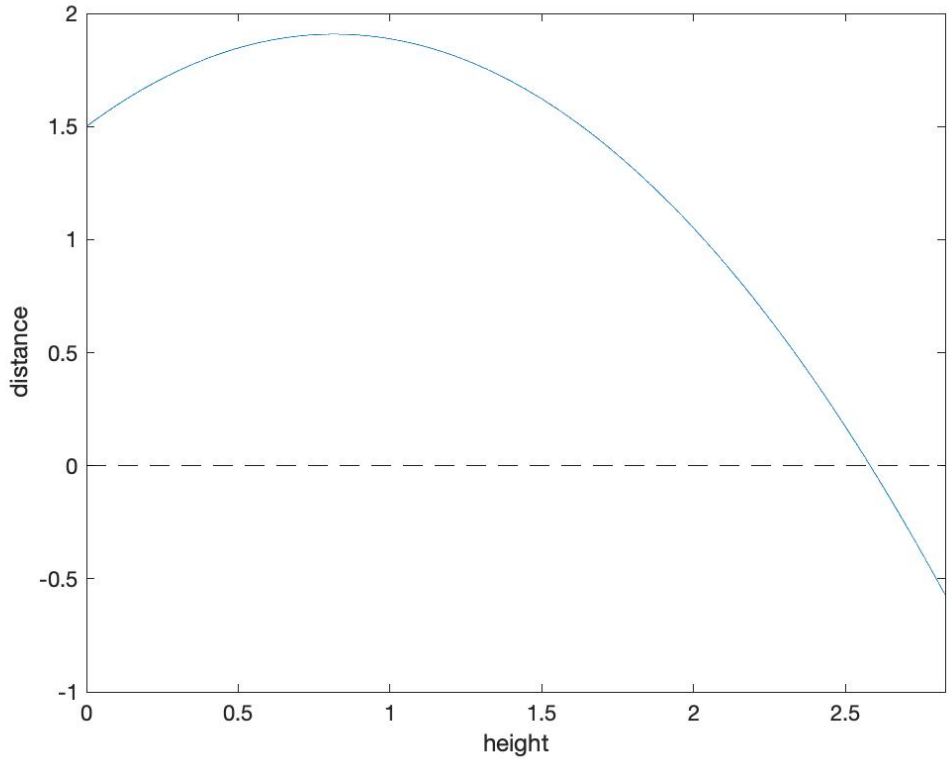
实验结果分析：

工作区

名称	值
Angle	45
ballHight	1.5000
G	9.8000
ind	913
str	'The ball hits the ...
t	*1x1000 double*
velocityOfBall	4
x	*1x1000 double*
xGround	2.5821
y	*1x1000 double*
z	*1x1000 double*

命令行窗口

```
>> throwBall
The ball hits the ground at a distance of 2.5821meters.
>>
```



实验数据正常，图像良好。

题目：Optional Problems 2

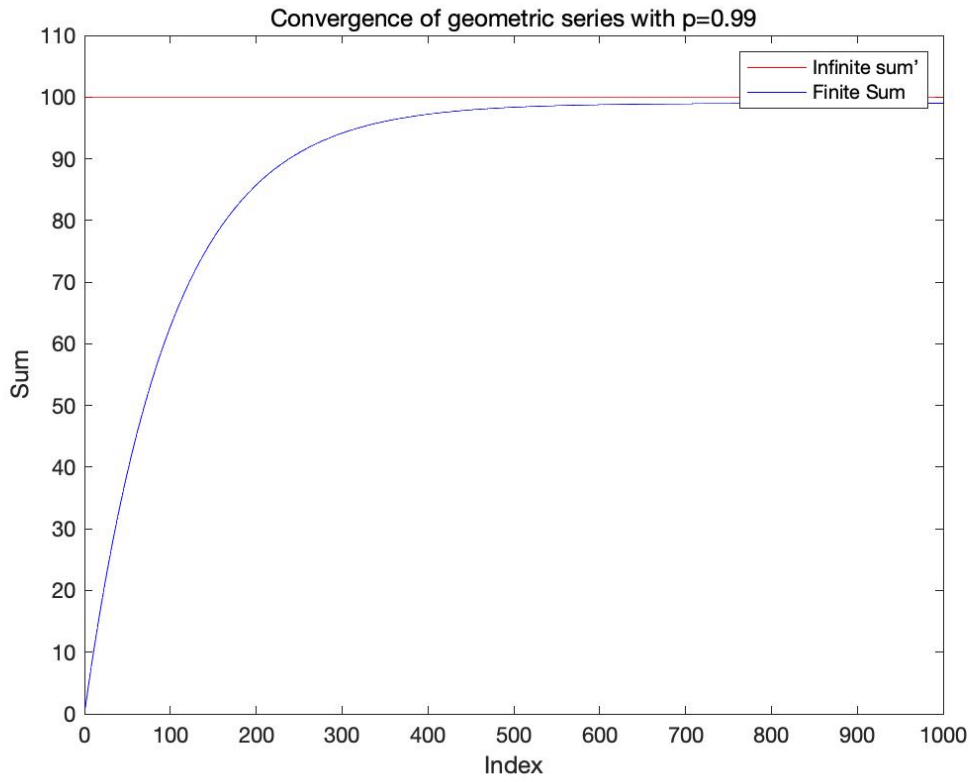
代码：

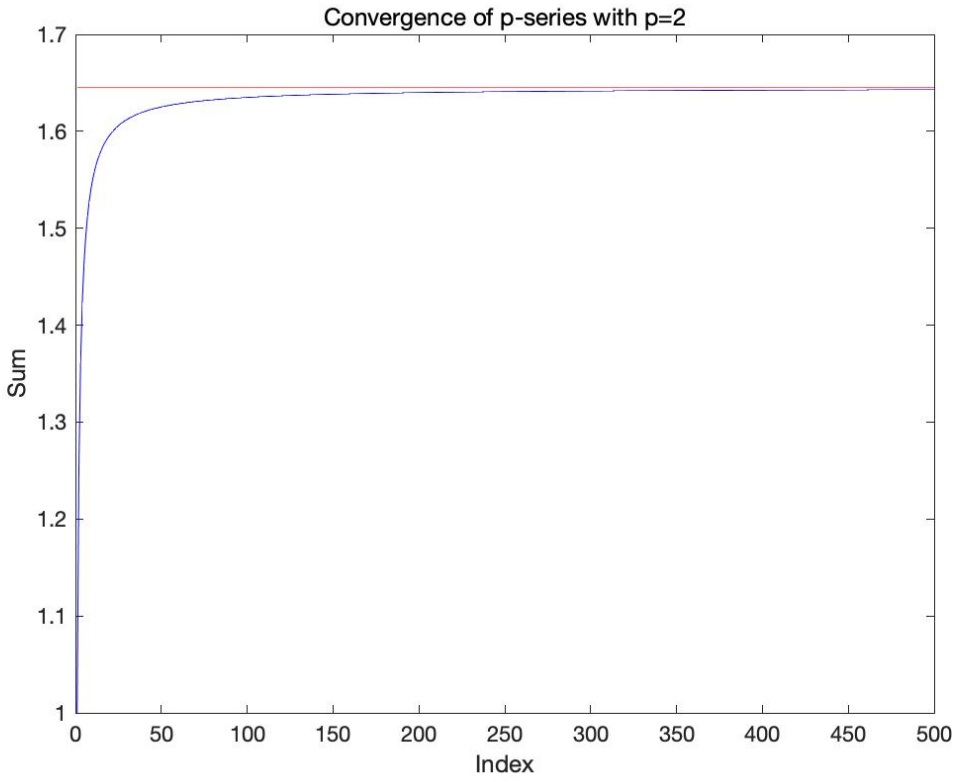
```
clear; clc;
p = 0.99;
k = 1:1000;
geomSeries = p.^k;
G = 1/(1-p);
figure(1);
y = G*ones(1,1000);
plot(k,y,'r')
hold on
sumGeomSeries = cumsum(geomSeries);
plot(k,sumGeomSeries,'b')
xlabel('Index');
ylabel('Sum');
ylim([0 110]);
title('Convergence of geometric series with p=0.99');
legend('Infinite sumâ€™','Finite Sum');

p = 2;
n = 1:500;
pSeries = 1./(n.^p);
sumPSeries = cumsum(pSeries);
P = pi^2/6;
y = P*ones(500,1);
figure(2)
plot(n,y,'r')
hold on;
plot(n,sumPSeries,'b')
title('Convergence of p-series with p=2');
xlabel('Index');
ylabel('Sum');
```

实验结果分析：

工作区

名称	值
G	100.0000
geomSeries	*1x1000 double*
k	*1x1000 double*
n	*1x500 double*
p	2
P	1.6449
pSeries	*1x500 double*
sumGeomSeries	*1x1000 double*
sumPSeries	*1x500 double*
y	*500x1 double*





数据正常，图像良好。

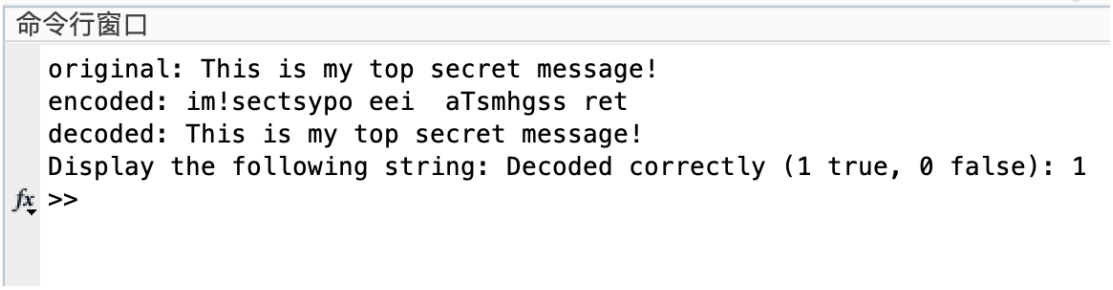
题目：Optional Problems 3

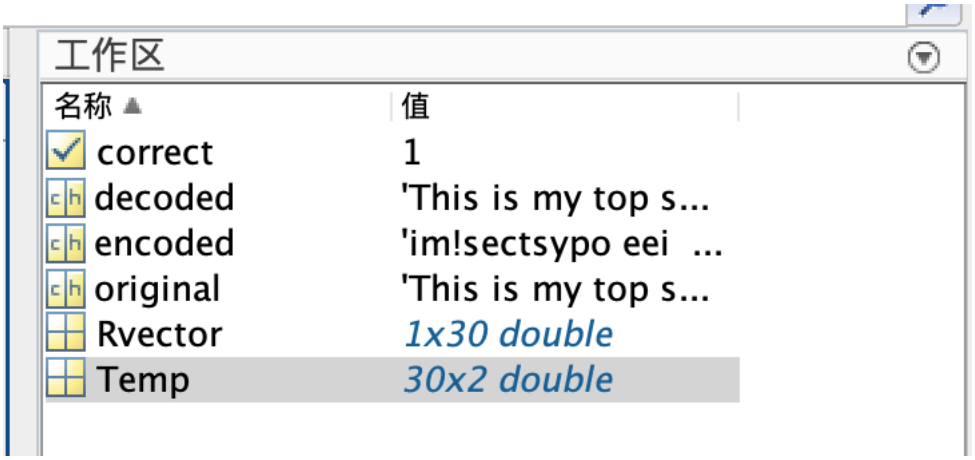
代码：

```
clear; clc;
original = 'This is my top secret message!';
Rvector = randperm(length(original));
encoded = original(Rvector);
Temp = zeros(length(original),2);
Temp(:,1) = Rvector';
Temp(:,2) = 1:length(original);
Temp = sortrows(Temp);
decoded = Temp(:,2);
decoded = encoded(decoded);
disp(['original: ' original])
disp(['encoded: ' encoded])
disp(['decoded: ' decoded])
correct = strcmp(original,decoded);
disp(['Display the following string: Decoded correctly (1 true, 0
```

```
false): ' num2str(correct)])
```

实验结果分析：





编解码正常。