

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：

工作区	
名称	值
a	10
A	1x100 double
aMat	9x9 double
aVec	[3.1400,15,9,26]
b	2.5000e+23
bMat	9x9 double
bVec	[2.1700;8;28;182]
c	2.0000 + 3.0000i
cMat	10x10 double
cSub	8x8 double
cSum	[55,155,255,355,...
cVec	1x51 double
d	-0.5000 + 0.8660i
dMat	3x4 double
dVec	1x101 double
eMat	[1,1,1;-22,10,-87]
eMean	[5.6667;-33]
eVec	'Hello'
fMat	5x3 double
ind	[1,3,4,5]
lin	1x20 double
r	[0,0.5688,0,0,0]
rlin	20x1 double
v	[1,2,3,4,5,4,3,2,1]
x	0.3029
xMat	9x9 double
y	6.2696e+03
yMat	4x4 double
z	-0.5232 - 1.2556i
zMat	9x9 double

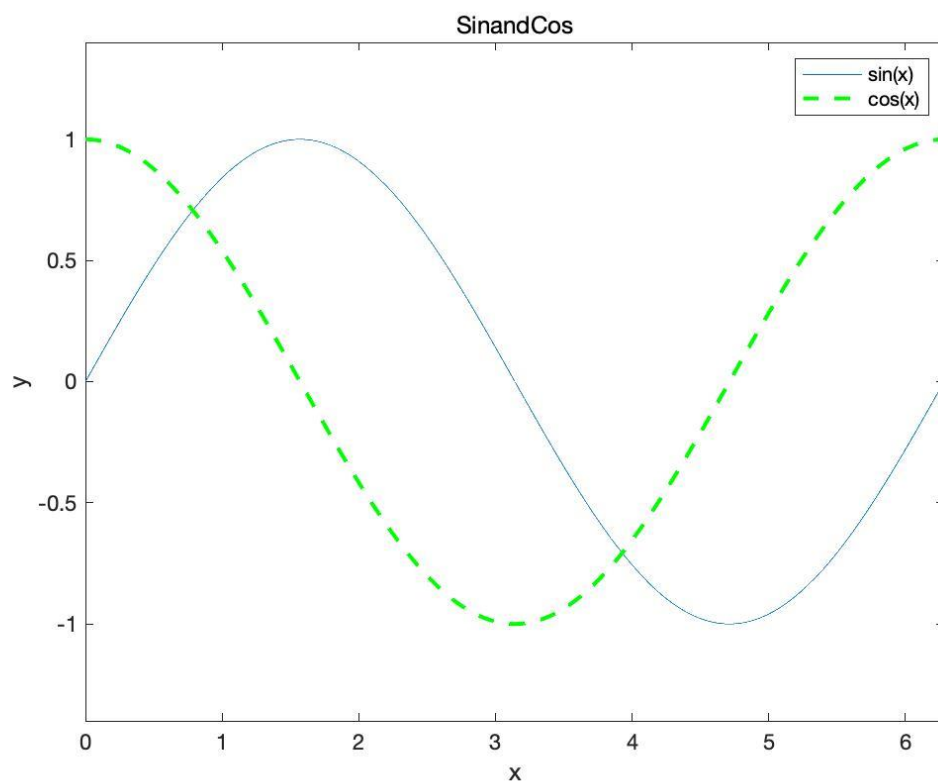
实验数据正常

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：



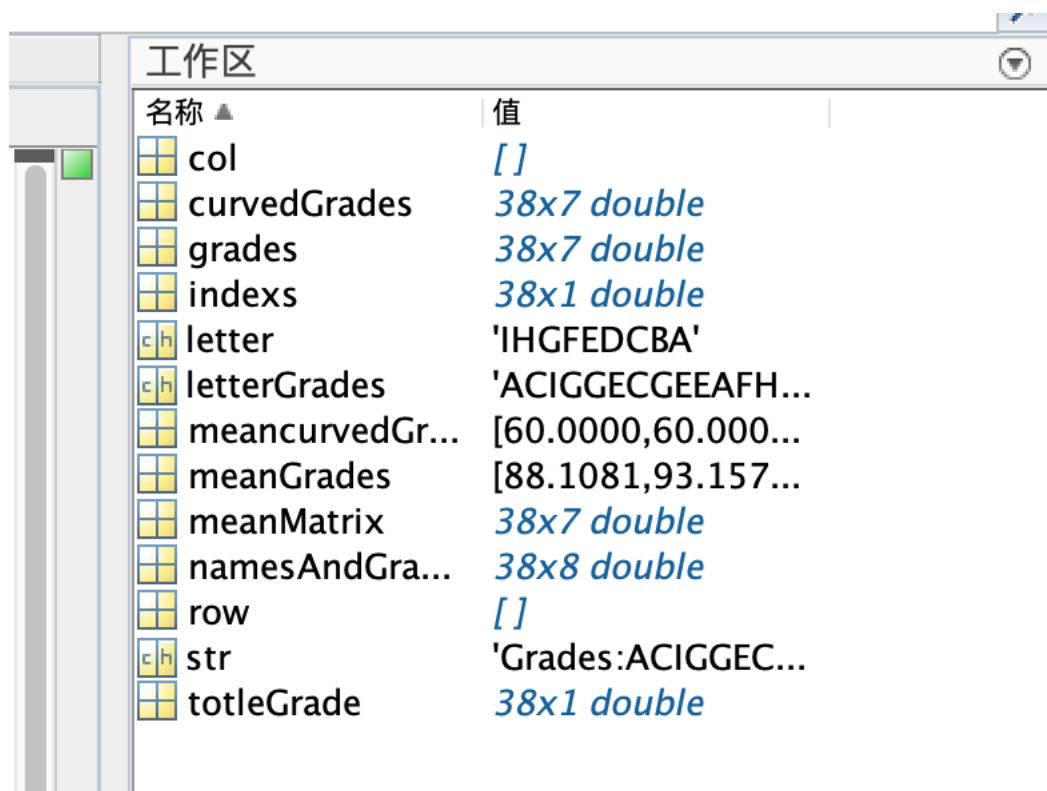
实验数据正常，函数图像良好。

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：



The image shows the MATLAB Workspace window with the following variables and their values:

名称	值
col	[]
curvedGrades	38x7 double
grades	38x7 double
indexs	38x1 double
letter	'IHGFEDCBA'
letterGrades	'ACIGGECGEEAFH...'
meancurvedGr...	[60.0000,60.000...
meanGrades	[88.1081,93.157...
meanMatrix	38x7 double
namesAndGra...	38x8 double
row	[]
str	'Grades:ACIGGEC...
totleGrade	38x1 double

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:ACIGGECGEEAFHFABECEABHFCDFEBAEEGCBBG								
fx >>								

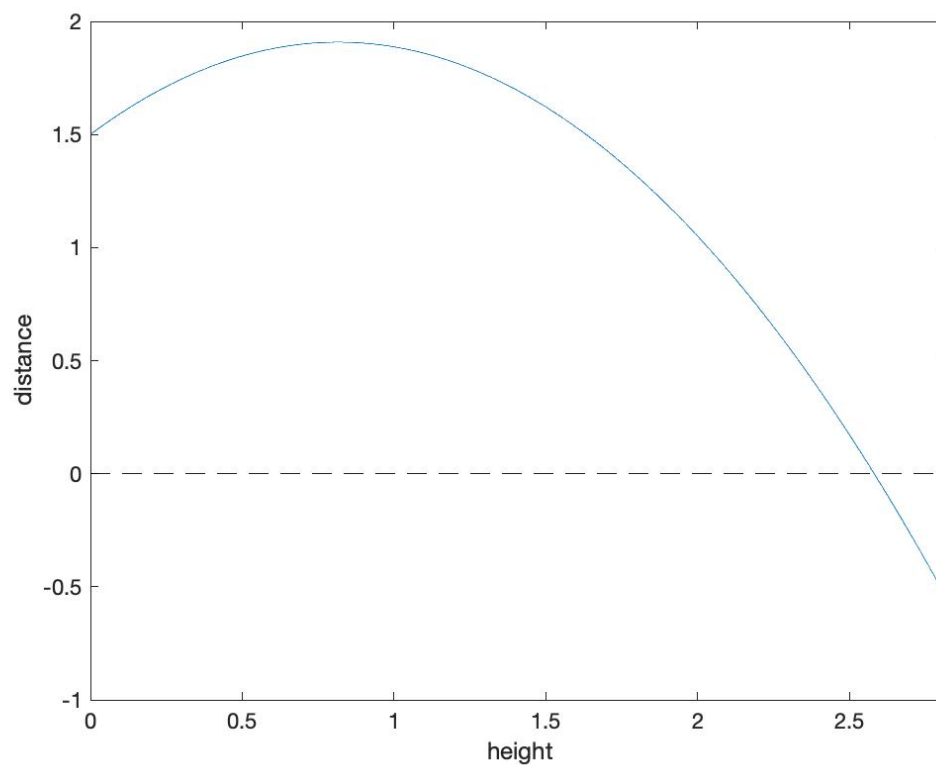
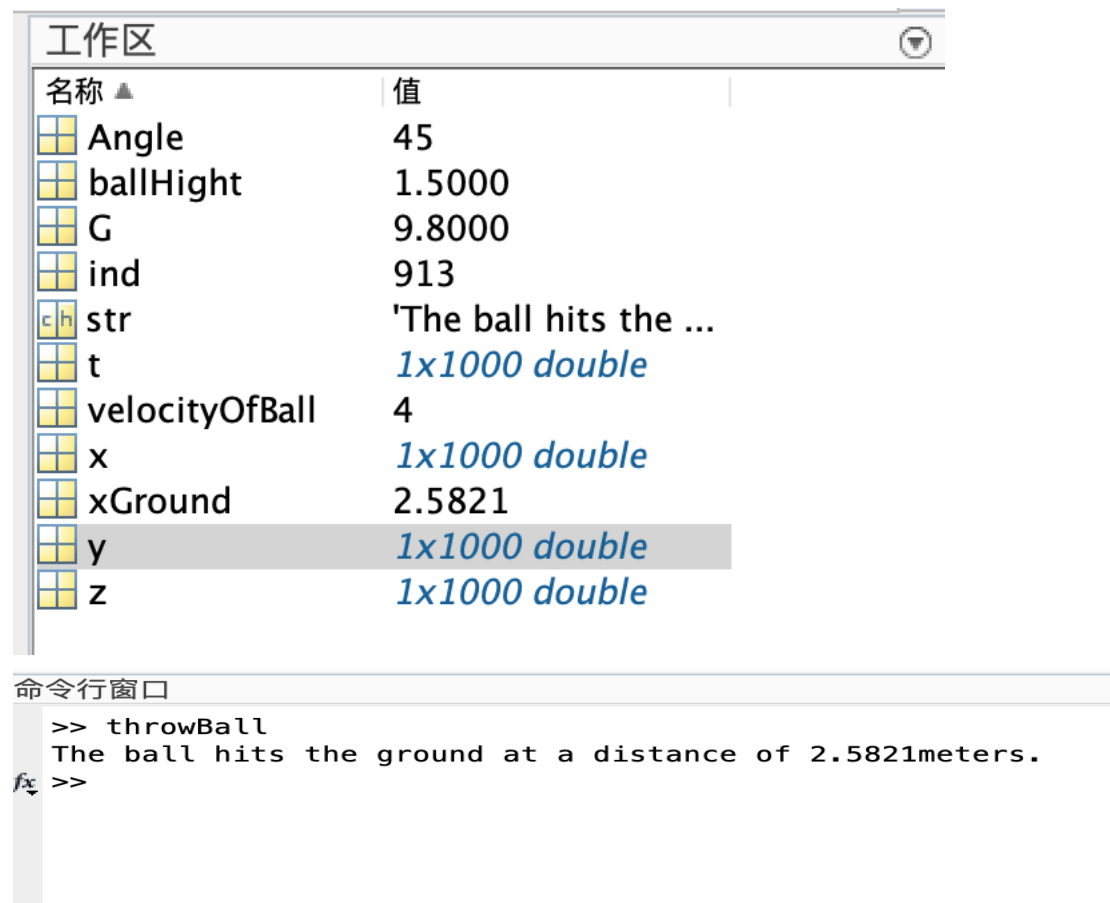
实验数据正常，没有出现换算后超出 100 分的情况，但仍做了处理。

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*sin(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：



实验数据正常，图像良好。

题目：Optional Problems 2

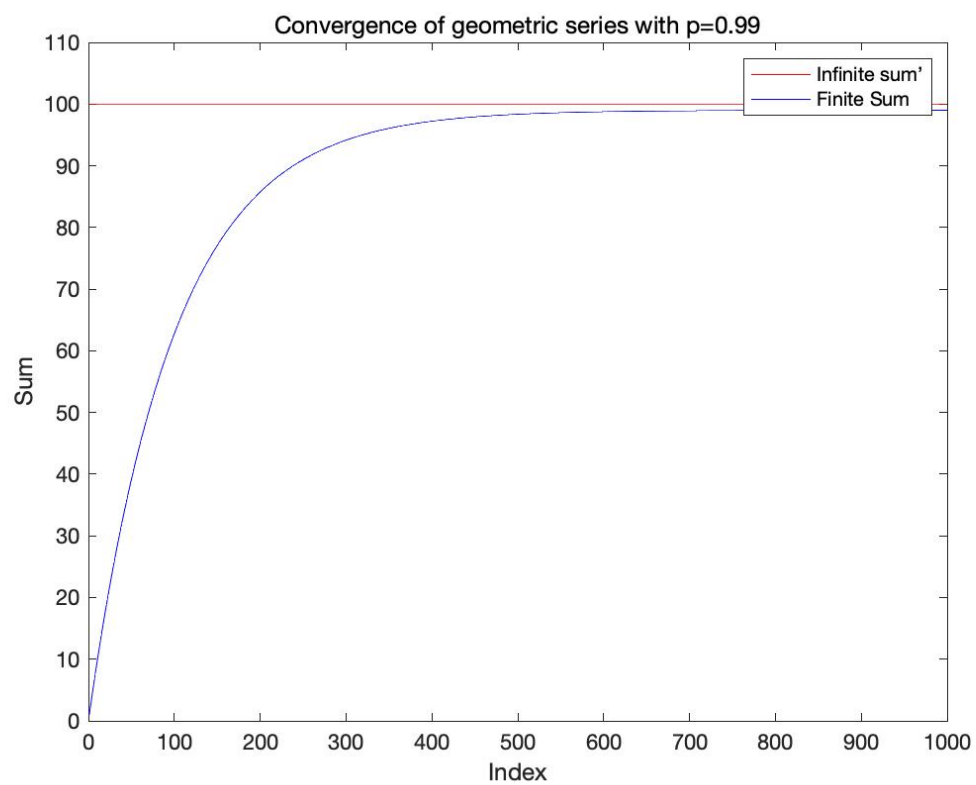
代码：

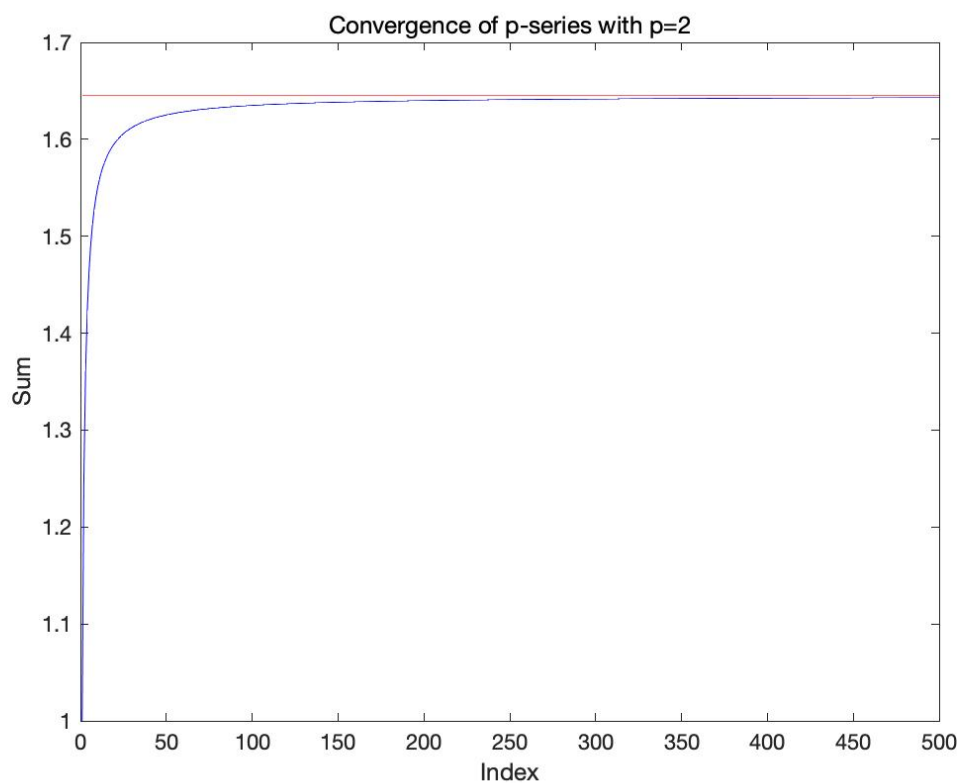
```
clear; clc;
p = 0.99;
k = 1:1000;
geomSeries = p.^k;
G = 1/(1-p);
figure(1);
y = G*ones(1,1000);
plot(k,y,'r')
hold on
sumGeomSeries = cumsum(geomSeries);
plot(k,sumGeomSeries,'b')
xlabel('Index');
ylabel('Sum');
ylim([0 110]);
title('Convergence of geometric series with p=0.99');
legend('Infinite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

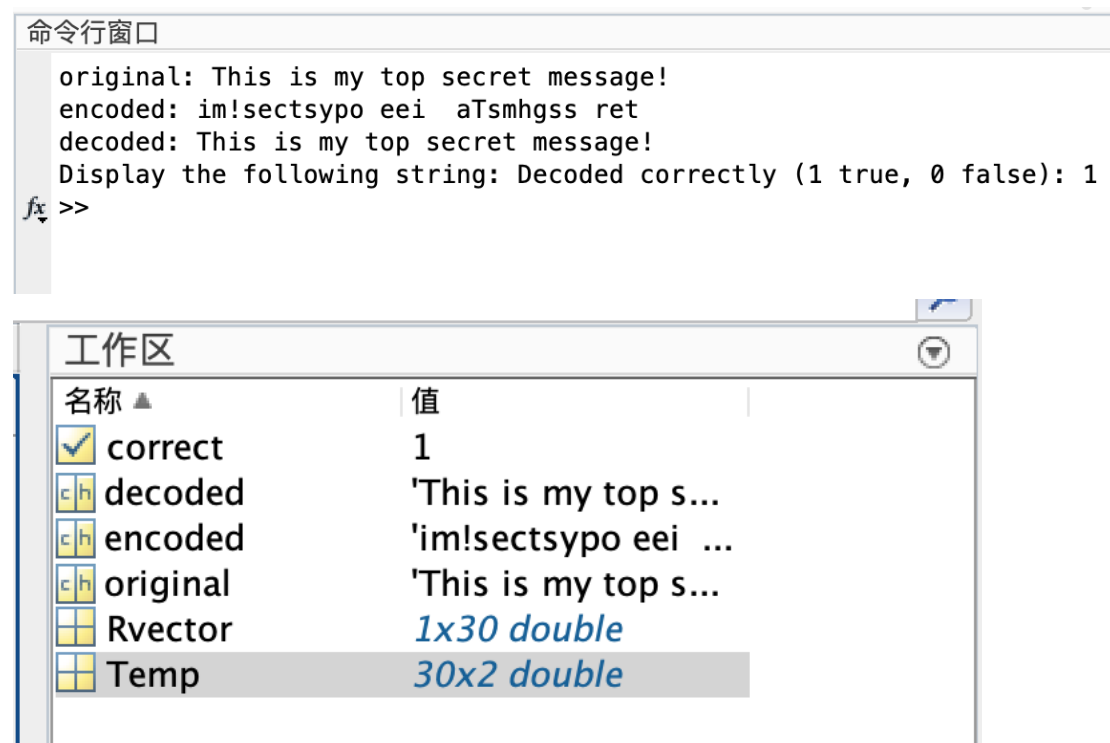
题目：Optional Problems 3

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。