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1.

Solution:

U(Win, bet)=W-B

U(lose, bet)=L-B

So U(bet)=Pw*U(win, bet)+Pl*U(lose, bet)

=Pw*(W-B)+(1-Pw)*(L-B)

If U(bet)>0 we would like to bet so

U(bet)>0➔ Pw*(W-B)+(1-Pw)*(L-B)>0

Pw*W-Pw*B+L-B-Pw*L+Pw*B>0

Pw*W+L-B-Pw*L>0

Because W>L

So when Pw>(B-L)/(W-L)

It should be accepted to bet

2.

Solution:

For the green wallet, the probability to pull a dime followed by two pennies= (4/10) x (6/9) x (5/8) = 120/720=1/6

For the black wallet, the probability pulled a dime followed by two pennies= (2/10) x (8/9) x (7/8) = 112/720

. Which wallet were you more likely to have picked if you pulled a dime followed by two pennies from it?

For this question:

<u>We assume that the probability to use one of the wallets is same and equal to ½=50%;</u>

So:

For the green wallet, the P=

(0.5*(120/720))/(0.5*(120/720)+0.5*(112/720))=120/(120+112)= 0.517241379

For the black wallet, the P=

(0.5*(112/720))/(0.5*(120/720)+0.5*(112/720))=112/(120+112)= 0.482758621

.What is the probability that the optimal answer you gave in the previous question was wrong?

Because we should consider about the past experience, the probability of using the wallet is not equal to ½=0.5

<u>The Pb=1/5 and the Pg=4/5</u>

So

For the green wallet, the P=

(4/5*(120/720))/(4/5*(120/720)+1/5*(112/720))= 0.810810811

For the black wallet, the P=

(1/5*(112/720))/(4/5*(120/720)+1/5*(112/720))= 0.189189189

3.

1).

```
function data=part1(mean,var,n)

data = mean+var.*randn(n,1);
figure(1)
plot(data);
```

I also attach my codes below

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main.m | part1.m | +

```
close all;
clear all;
clc
prompt1='Please input the mean\n';
mean=input(prompt1);
prompt2='Please input the var\n';
var=input(prompt2);
prompt3='Please input the number N\n';
n=input(prompt3);
data=part1(mean,var,n);

figure(1)
plot(data);
```

main.m | part1.m | +

```
function data=part1(mean,var,n)

data = mean+var.*randn(n,1);
```

2).

We all know the function randn() generates datasets with a normal distribution.

So:

We all know the formula of variance:

$$s^2 = \frac{(x_1 - M)^2 + (x_2 - M)^2 + (x_3 - M)^2 + \cdots + (x_n - M)^2}{n}$$ and var=s

Mean3= (2000*1+1000*4)/(2000+1000)=2

Var1^2=∑(X1-1)^2/2000=2

Var2^2=∑(X2-4)^2/1000=3
Var3^2==∑(X3-mean3)^2/(n1+n2)

Important:
Var3^2=[n1(var1^2+mean1^2)+n2(var2^2+mean2^2)]/(n1+n2)
n1*var1^2=∑(X1-mean)^2
n2*var^2=∑(X2-mean)^2
Var3^2= [n1*var1^2+n2*var^2+n1*(mean1-mean3)^2+n2*(mean2-mean3)^2]/(n1+n2)

There's a formula for the combined variance:

$$S_c{}^2 = \frac{n_1 S_1{}^2 + n_2 S_2{}^2 + n_1\left(\overline{X}_1 - \overline{X}_c\right)^2 + n_2\left(\overline{X}_2 - \overline{X}_c\right)^2}{n_1 + n_2}$$

Apparently We can see that:
Var3^2=(2000*4+1000*9+2000*(1-2)^2+1000*(4-2)^2)/3000
=(8000+9000+2000+4000)/3000
=23/3

So var3=sqrt(23/3)=2.77

I also attach my Codes:

```
close all;
clear all;
clc
data1=part1(1,2,2000);
data2=part1(4,3,1000);
data3=[data1;data2];
figure(1)
histfit(data1,2000);
figure(2)
histfit(data2,1000);
figure(3)
histfit(data3,3000);
```

The following is my plots in matlab:

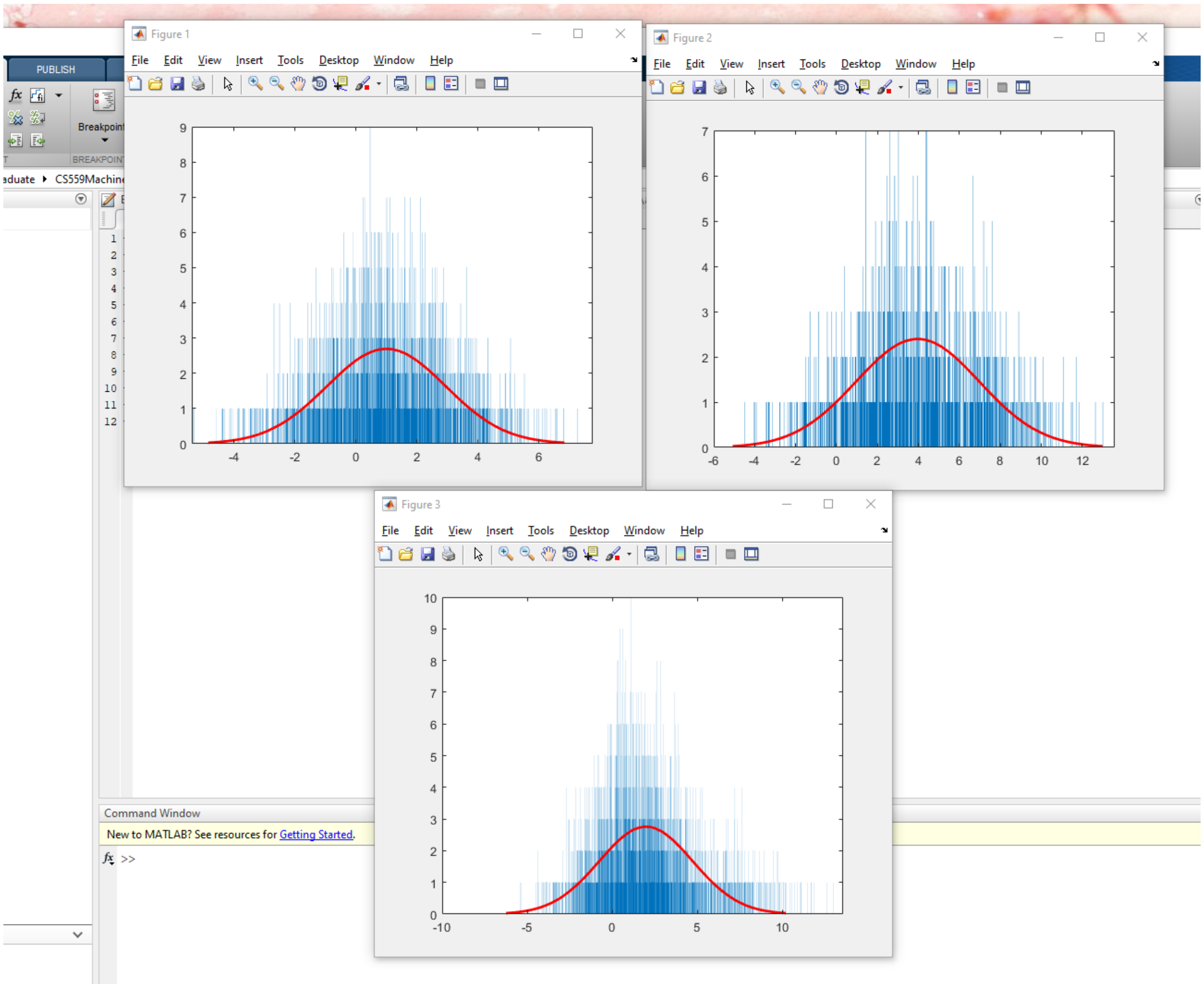
Figure 1
File Edit View Insert Tools Desktop Window Help
Figure 2
File Edit View Insert Tools Desktop Window Help
Figure 3
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