Homework1- Wei Ye

Question 1

```
A1=[1 2 3;4 5 6;7 8 9;10 11 12]
```

```
A1 = 4×3
     1     2     3
     4     5     6
     7     8     9
    10    11    12
```

```
%Construct the following matrices based on A1.
a=[A1(1,1:2);A1(2,1:2)]
```

```
a = 2×2
     1     2
     4     5
```

```
b=[A1(1,1) A1(4,3);A1(2,1) A1(3,3);A1(3,1) A1(2,3);A1(4,1) A1(1,3)]
```

```
b = 4×2
     1    12
     4     9
     7     6
    10     3
```

```
c=[A1(1,1) A1(1,3);A1(3,1) A1(3,3)]
```

```
c = 2×2
     1     3
     7     9
```

```
d=[A1(:,1)';A1(:,2)';A1(:,3)']
```

```
d = 3×4
     1     4     7    10
     2     5     8    11
     3     6     9    12
```

```
e=[A1(4,:);A1(3,:);A1(2,:);A1(1,:)]
```

```
e = 4×3
    10    11    12
     7     8     9
     4     5     6
     1     2     3
```

Question 2

```
A2=[13 14 15;16 17 18;19 20 21;22 23 24]
```

```
A2 = 4×3
    13    14    15
    16    17    18
    19    20    21
    22    23    24
```

```
M(:,:,1)=A1
```

```
M =
M(:,:,1) =

     1     2     3
     4     5     6
     7     8     9
    10    11    12


M(:,:,2) =

    13    14    15
    16    17    18
    19    20    21
    22    23    24
```

```
M(:,:,2)=A2
```

```
M =
M(:,:,1) =

     1     2     3
     4     5     6
     7     8     9
    10    11    12


M(:,:,2) =

    13    14    15
    16    17    18
    19    20    21
    22    23    24
```

```
M1=[A2(:,1) A2(:,2)]
```

```
M1 = 4×2
    13    14
    16    17
    19    20
    22    23
```

```
M2=[M(1,:,1);M(1,:,2)]
```

```
M2 = 2×3
     1     2     3
    13    14    15
```

```
M3=[M(:,3,2) M(:,1,1)]
```

```
M3 = 4×2
    15     1
    18     4
    21     7
    24    10
```

```
M4(:,:,1)=M(:,3,1);
M4(:,:,2)=M(:,1,2);
M4
```

```
M4 =
M4(:,:,1) =

     3
     6
     9
    12


M4(:,:,2) =

    13
    16
    19
    22
```

Q3

```
x1=[1:2:100]
```

```
x1 = 1×50
     1     3     5     7     9    11    13    15    17    19    21    23    25 ···
```

Q4

```
x2=[linspace(0,100,300)]
```

```
x2 = 1×300
         0    0.3344    0.6689    1.0033    1.3378    1.6722    2.0067    2.3411 ···
```

Q5

```
x3=x1(:,20:35)
```

```
x3 = 1×16
    39    41    43    45    47    49    51    53    55    57    59    61    63 ···
```

Q6

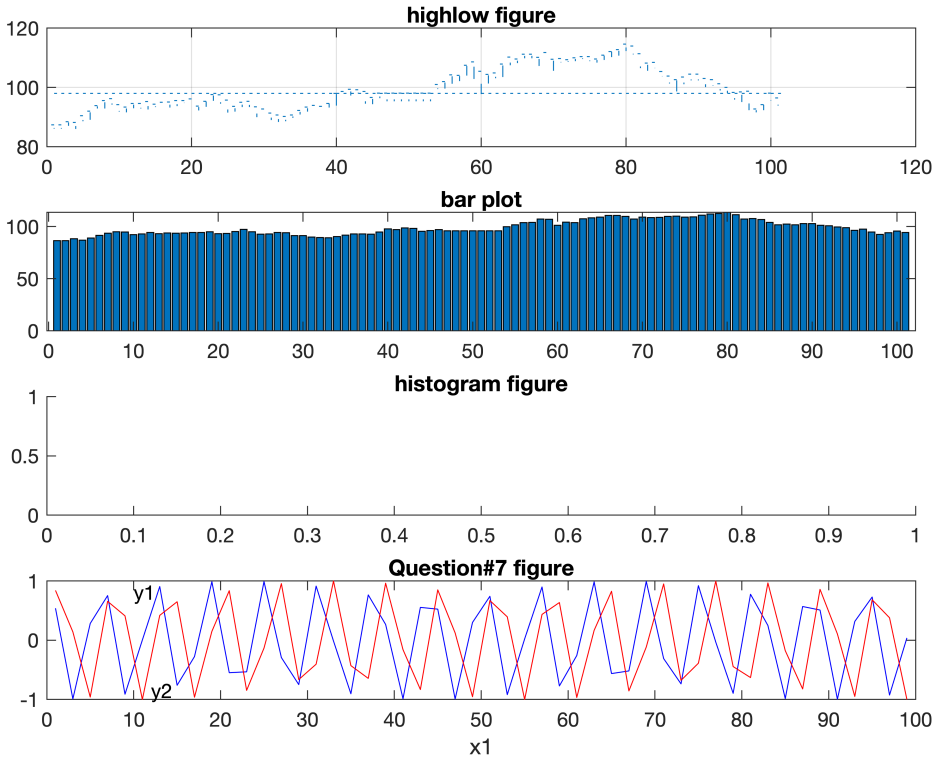
```
x4=x1(1,2:2:10)
```

```
x4 = 1×5
     3     7    11    15    19
```

Q7

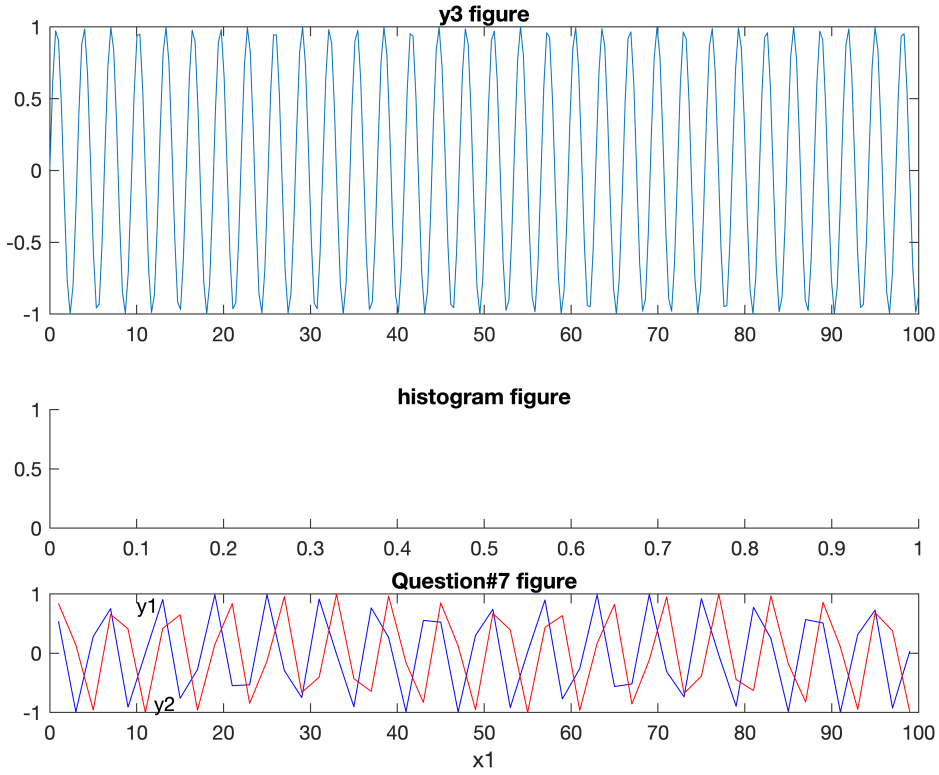
```
y1=cos(x1);
y2=sin(x1);
plot(x1,y1,'b')
title("Question#7 figure")
xlabel("x1");
text(10,0.81,"y1")
hold on
plot(x1,y2,"r")
text(12,-0.85,"y2")
```

```
hold off
```



Q8

```
y3=2*sin(x2).*cos(x2);
y4=sin(2*x2);
subplot(2,1,1)
plot(x2,y3);
title("y3 figure")
```




```
subplot(2,1,2)
plot(x2,y4)
title("y4 figure")
```

Q9

```
products=[1 2 3]%products within one years
```

```
products = 1×3
     1     2     3
```

```
cost=[1 2 3]%cost for goods
```

```
cost = 1×3
     1     2     3
```

```
price=[2 3 4]%price
```

```
price = 1×3
     2     3     4
```

```
profits=products.*price'-products.*cost'%profits
```

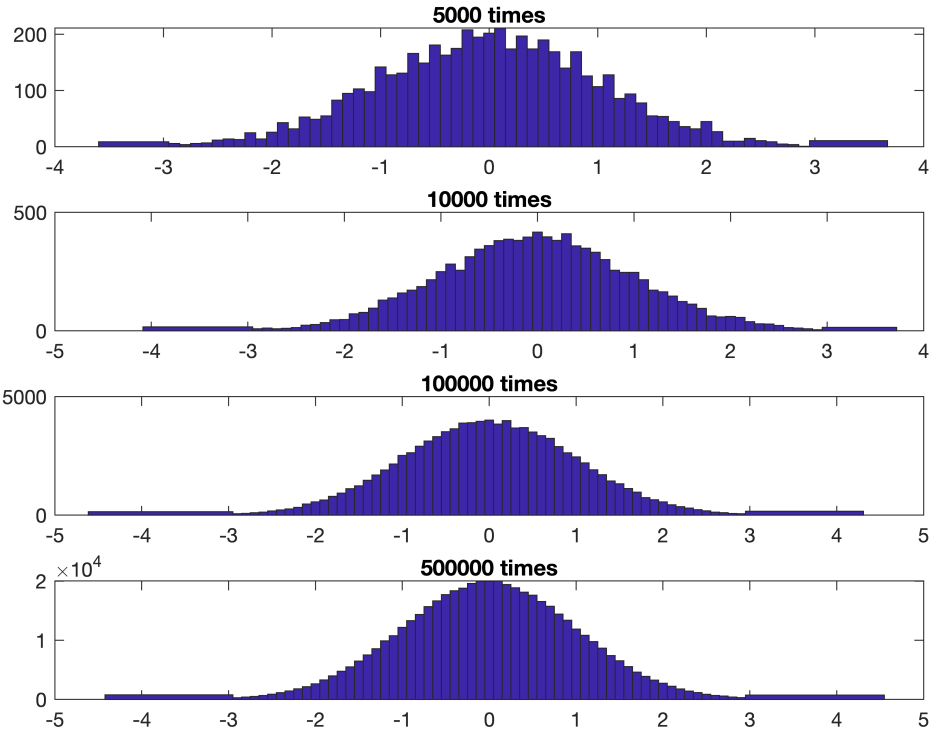
```
profits = 3×3
     1     2     3
     1     2     3
     1     2     3
```

%prices and quantities are positively correlated with profits.

```
close all hidden;
axes;
```

Q10

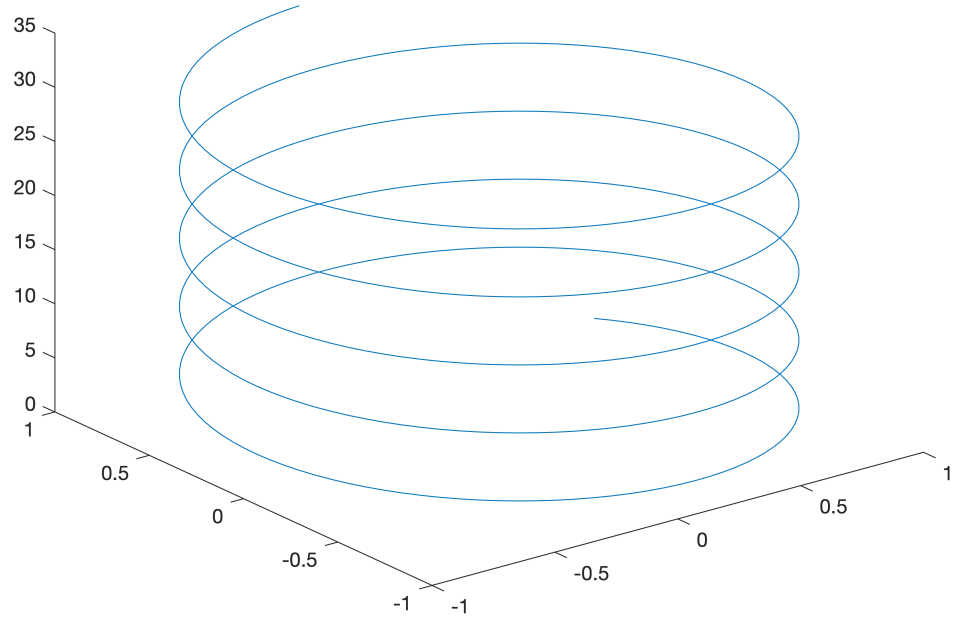
```
x=-3:0.1:3;
n1=randn(5000,1);
n2=randn(10000,1);
n3=randn(100000,1);
n4=randn(500000,1);
subplot(4,1,1)
hist(n1,x);
title("5000 times")
subplot(4,1,2)
hist(n2,x)
title('10000 times')
subplot(4,1,3)
hist(n3,x)
title("100000 times")
subplot(4,1,4)
hist(n4,x)
title("500000 times")
```



Q11

```
t=1:pi/50:10*pi;
```

```
x=sin(t);
y=cos(t);
z=t;
figure;
plot3(x,y,z)
```



Q12

```
cashflow=[-15000,5000,2500,5700,2500,6000];
irr1=irr(cashflow)
```

```
irr1 = 0.1333
```

```
npv=pvvar(cashflow,0.05)
```

```
npv = 3.7113e+03
```

Do this reject, because irr is way higher than opportunity cost rate.

Q13

irr1<15%, don't do the project.

Q14

When the rate is equal to the second best rate, in this case, the investors make no difference between different project.

Q15

```
project1=[-1000,800,950,1500,2000];
project2=[-1000,1500,1200,500,400];
npv_1=pvvar(project1,0.05)
```

```
npv_1 = 3.5647e+03
```

```
npv_2=pvvar(project2,0.05)
```

```
npv_2 = 2.2780e+03
```

```
irr_1=irr(project1)
```

```
irr_1 = 0.9507
```

```
irr_2=irr(project2)
```

```
irr_2 = 1.1902
```

I prefer project2, even though it has lower npv, we care about irr, which is higher than project1. Therefore, project 1 is picked.

Q16

```
annual_rate=0.05;
Loan=500000;
NumPeriods=12*30;
monthly_rate=(1+annual_rate)^(1/12)-1;
[Principal,Interest,Balance,Payment]=amortize(monthly_rate,NumPeriods,Loan)
```

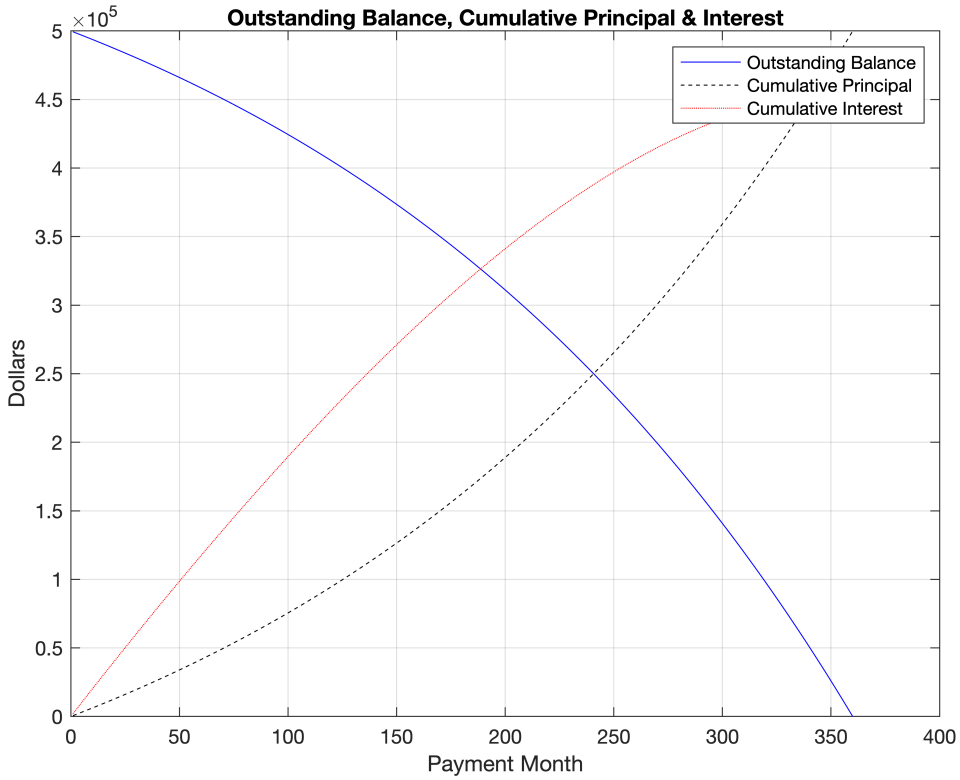
```
Principal = 1×360
10^3 ×
    0.6132    0.6157    0.6182    0.6207    0.6233    0.6258    0.6284    0.6309 ···
Interest = 1×360
10^3 ×
    2.0371    2.0346    2.0321    2.0295    2.0270    2.0245    2.0219    2.0194 ···
Balance = 1×360
10^5 ×
    4.9939    4.9877    4.9815    4.9753    4.9691    4.9628    4.9565    4.9502 ···
Payment = 2.6503e+03
```

```
payment_vector=repmat(Payment,NumPeriods,1);
amor_table=[Balance',Interest',Principal',payment_vector]
```

```
amor_table = 360×4
10^5 ×
    4.9939    0.0204    0.0061    0.0265
    4.9877    0.0203    0.0062    0.0265
    4.9815    0.0203    0.0062    0.0265
    4.9753    0.0203    0.0062    0.0265
    4.9691    0.0203    0.0062    0.0265
    4.9628    0.0202    0.0063    0.0265
    4.9565    0.0202    0.0063    0.0265
    4.9502    0.0202    0.0063    0.0265
    4.9439    0.0202    0.0063    0.0265
    4.9375    0.0201    0.0064    0.0265
```

```
plot(Balance,'b'), hold('on')
plot(cumsum(Principal),'--k')
plot(cumsum(Interest),':r')

xlabel('Payment Month')
ylabel('Dollars')
grid('on')
title('Outstanding Balance, Cumulative Principal & Interest')
legend('Outstanding Balance', 'Cumulative Principal', 'Cumulative Interest')
hold off
```



Q17

```
load ibm.dat;
[ro, co] = size(ibm);
subplot(4,1,1);
highlow(ibm(ro-100:ro,2),ibm(ro-100:ro,3),ibm(ro-100:ro,4),'b')
```

```
Warning: This syntax will be removed in a future release. See the documentation for recommended
usage.
Warning: Low prices must be less than or equal to the corresponding high prices.
Warning: Opening prices must be less than or equal to the corresponding high prices.
Warning: Low prices must be less than or equal to the corresponding closing prices.
Warning: Closing prices must be less than or equal to the corresponding High prices.
```

```
title('highlow figure')
subplot(4,1,2);
```

```
bar(ibm(ro-100:ro,4))
title('bar plot')
subplot(4,1,3);
nbins=20
```

```
nbins = 20
```

```
histogram(ibm(ro-100:ro,4),nbins)
title('histogram figure')
subplot(4,1,4);
bolling(ibm(ro-100:ro,4), 30, 0)
```

```
Warning: BOLLING will be removed in a future release. Use BOLLINGER instead.
```

```
title('bollinger bands')
```