MATLAB HW2

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Problem 1

```
clear all; clc;
% given value
A = [0 -1 4; 9 -14 25; -34 49 64];
B = A; % copy A to B
B(B>0) = sqrt(B(B>0));
B(B<0) = B(B<0)+50;
disp(B);
```

```
     0    49     2
     3    36     5
    16     7     8
```

Problem 2

```
clear all; clc;
% given values
acc = 500; final = 10000; cnt = 0;
% when the accumulate account less than final aim, continue the loop
while acc < final
    acc = acc *1.05+500; % interest and new deposit
    cnt = cnt +1; % year count
end
fprintf('It takes %d years. \n', cnt);
```

```
It takes 14 years.
```

Problem 3

```
clear all; clc;
% given values
price = [19 18 22 21 25 19 17 21 27 29];
```

```
shares = 1000;
buy_money = 0; sell_money = 0;
% iterate the price
for i = price
    % judge if the price today matches the expectation
    if i < 20 % buy in shares
        buy_money = buy_money + 100*i;
        shares = shares +100;
    elseif i > 25 % sell out shares
        sell_money = sell_money +100*i;
        shares = shares -100;
    end
end
fprintf('Spent in buying shares: $%d \n', buy_money);
fprintf('Received from selling shares: $%d \n', sell_money);
fprintf('Number of shares: $%d \n', shares);
fprintf('Net increase: $%d \n', sell_money-buy_money
+shares*price(end)-1000*price(1));
```

```
Spent in buying shares: $7300
Received from selling shares: $5600
Number of shares: $1200
Net increase: $14100
```

Problem 4

```
clear all; clc;
% given values
x = [1 7 8 17 22 27]; y = [28 18 16 2 10 8]; V = [3 7 4 5 2 6];
m = 0; n = 0; C = 10000000000000000000;
% iterate for all integer positions on the map
for p = 0:1:30
    for q = 0:1:30
        tmp = 0;
        % compute the cost
        for i = 1:1:6
            tmp = tmp + 0.5*sqrt((p-x(i))^2+(q-y(i))^2)*V(i);
        end
        % exchange for a minimum cost
        if tmp < C
            C = tmp;
            m = p; n = q;
        end
    end
end
fprintf('The location required is: (%d, %d). \n', m, n);
```

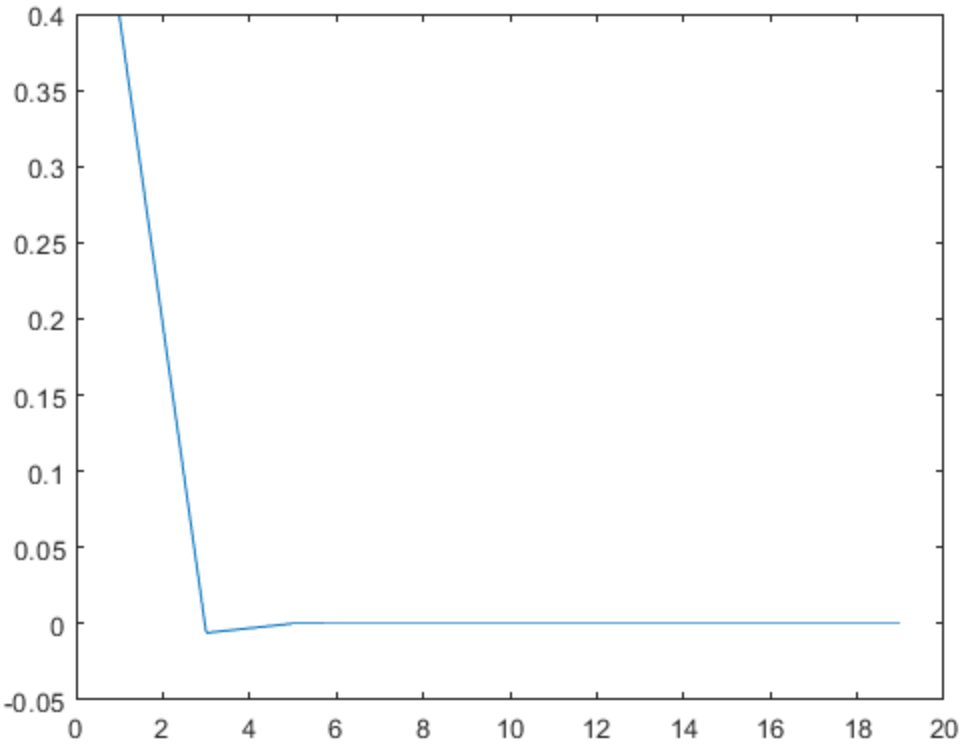
```
The location required is: (9, 16).
```

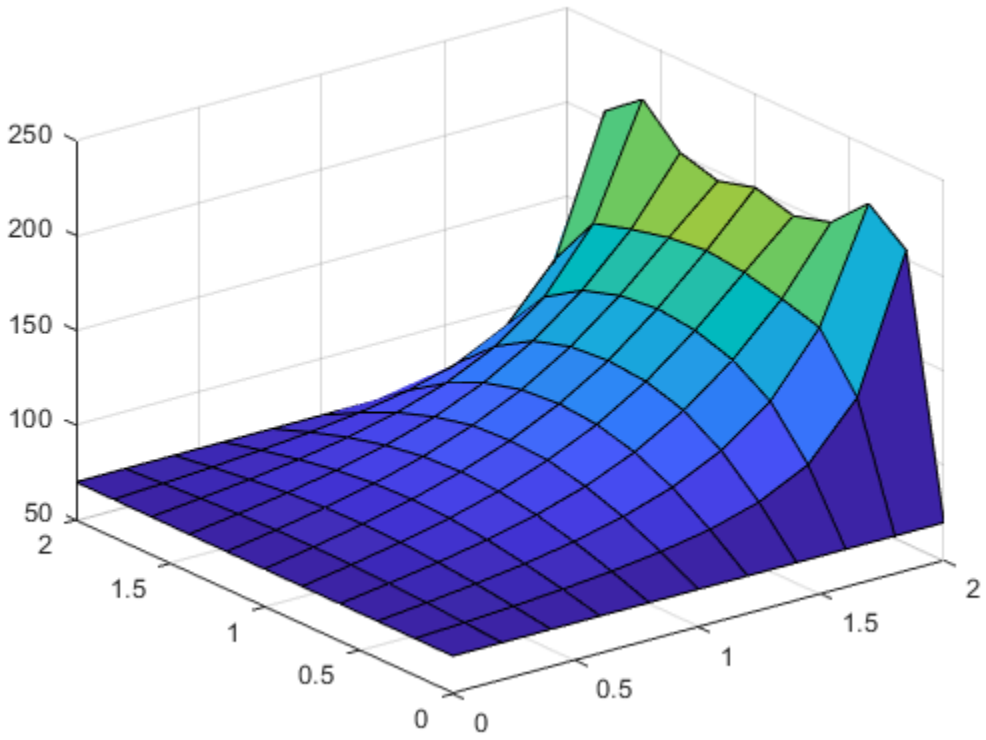
Problem 5

```
clear all; clc;
```

```
% given values
T1 = 70; T2 = 200; W = 2; L = 2;
% a
% for x = y = 1, verify the fact
n = 1:2:19;
w = (2./n).*sin(n*pi/L).*sinh(n*pi/L)./sinh(n*pi*W/L);
figure;
plot(n,w);

% b
mysum = 0; terms = 1;
% loop search until find the term that satisfy the requirement
while (1)
    tmp = (2/terms)*sin(terms*pi/L)*sinh(terms*pi/L)/sinh(terms*pi*W/
L);
    if abs(tmp/mysum) < 0.01
        break;
    else
        terms = terms + 2;
        mysum = mysum+tmp;
    end
end
fprintf('require %d terms. \n', terms);

% c
x = 0:0.2:L; y = 0:0.2:W;
mysum = zeros(length(x),length(y));
p = 0;
for xt = 0:0.2:L
    p = p+1; q = 0;
    for yt = 0:0.2:W
        q = q+1;
        n = 1;
        while (1)
            tmp = (2/n)*sin(n*pi*xt/L)*sinh(n*pi*yt/L)./sinh(n*pi*W/
L);
            if mysum(p,q) == 0 && (xt == 0 || yt == 0)
                break;
            end
            if abs(tmp/mysum(p,q)) < 0.01
                break;
            else
                n = n + 2;
                mysum(p,q) = mysum(p,q)+tmp;
            end
        end
    end
end
T = (T2-T1)*(2/pi*mysum)+T1;
[X,Y] = meshgrid(x,y);
figure;
surf(X,Y,T);
```

require 5 terms.


0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
0
2
4
6
8
10
12
14
16
18
20


250
200
150
100
50
2
1.5
1
0.5
0
0
0.5
1
1.5
2

Problem 6

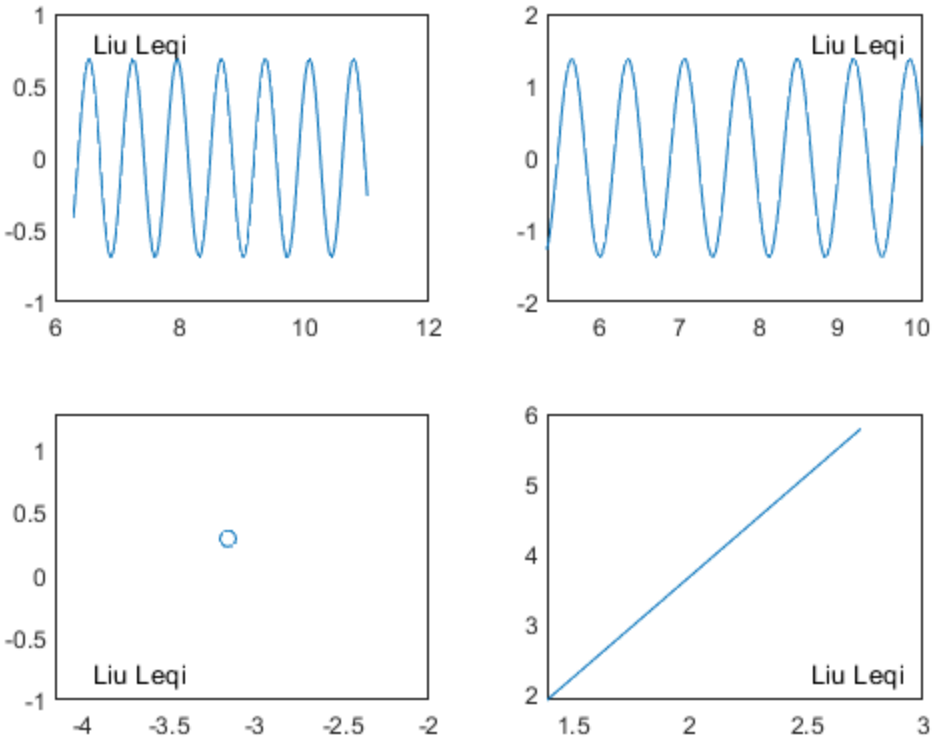
```
clear all; clc;
% given values
B = 10000; rate = 0.01; interest = 0; cur = 0;
disp('Current month  Interest rate  Amount of interest this month  New
 balance  Total interest earned');
for mon = 1:1:12
    % judge if satisfy the condition of interest rate
    if B <= 15000
        rate = 0.01;
    elseif B <= 20000
        rate = 0.015;
    else
        rate = 0.02;
    end
    cur = B*rate;
    interest = interest+B*rate;
    B = B+cur+1000;
    fprintf('%d        %.1f%%        $%.2f        $%.2f        $%.2f
 \n', mon, rate*100, cur, B, interest);
end
```

```
Current month  Interest rate  Amount of interest this month  New
 balance  Total interest earned
1        1.0%        $100.00        $11100.00        $100.00
2        1.0%        $111.00        $12211.00        $211.00
3        1.0%        $122.11        $13333.11        $333.11
4        1.0%        $133.33        $14466.44        $466.44
5        1.0%        $144.66        $15611.11        $611.11
6        1.5%        $234.17        $16845.27        $845.27
7        1.5%        $252.68        $18097.95        $1097.95
8        1.5%        $271.47        $19369.42        $1369.42
9        1.5%        $290.54        $20659.96        $1659.96
10        2.0%        $413.20        $22073.16        $2073.16
11        2.0%        $441.46        $23514.62        $2514.62
12        2.0%        $470.29        $24984.92        $2984.92
```

Problem 7

```
clear all; clc;
% x data
xmin = -10+(10-(-10)).*rand;
xrange = 2+(5-2)*rand;
xmax = xmin+xrange;
numPts = 150;
x = linspace(xmin, xmax, numPts);
x2 = x-0.2*xrange;

% y data
Amp = 0.5+(2-0.5).*rand;
Freq = 0.5+(1.5-0.5).*rand;
y = Amp*sin(2*pi*Freq*x);
```

```
y2 = 2*Amp*cos(2*pi*Freq*x2);

r = 2; c = 2;

subplot(r, c, 1);
plot(x, y);
myPutText('Liu Leqi', 'NorthWest');

subplot(r, c, 2);
plot(x2, y2);
myPutText('Liu Leqi', 'NorthEast');

subplot(r, c, 3);
plot(-5*rand, 3*rand, 'o');
myPutText('Liu Leqi', 'SouthWest');

subplot(r, c, 4);
plot([5*rand 5*rand], [2*rand 6*rand]);
myPutText('Liu Leqi', 'SouthEast');

function myPutText(name, position)
    switch position
        case 'NorthWest'
            x = 0.10; y = 0.90;
        case 'NorthEast'
            x = 0.70; y = 0.90;
        case 'SouthWest'
            x = 0.10; y = 0.10;
        case 'SouthEast'
            x = 0.70; y = 0.10;
        otherwise
            x = 0.00; y = 0.00;
    end
    text('string', name, 'Units', 'normalized', 'position', [x, y]);
end
```



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