Problem 1. [30 points] Short answers questions

(1) [3 points] Let x be a 1x2 row vector, and v is a 2x1 column vector.

```
x = [1 4]
y = [2; 1]
```

What is the result of the following expression? Please first compute the results by hand and verify them using MATLAB (please be careful on which one use element-wise multiplication).

a) 6
b) [2,4]
c) [2,8;1,4]

(2)

```
 2
-5
 0
-8

 1   2   3   4
 1   1   1   1

 2   4
-5  -10
 0   0
-8  -16

-40  -80
-11  -22
```

(3)

```
x = 0:9;
y = 2*ones(1,10);
z = y.^x;
```

(4)

```
 1   2   3   4

 2
 6
10

 3   4
```

```
    11    12

     5
```

(5)

```
x = 0:999;
b = 1:1000;
y = -1*ones(1,1000);
z = y.^x;
disp(z.*b)
```

(6)

```
    -2
    -3
    15
```

(7)

```
A*B'
```

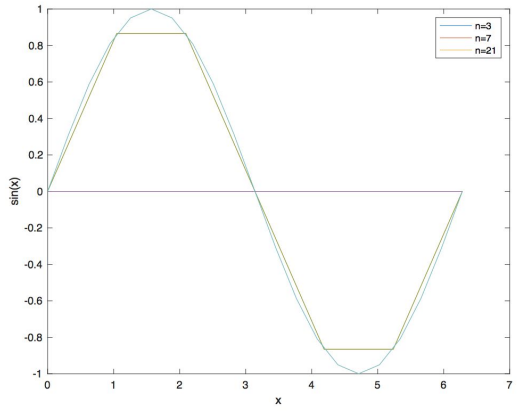
(8)

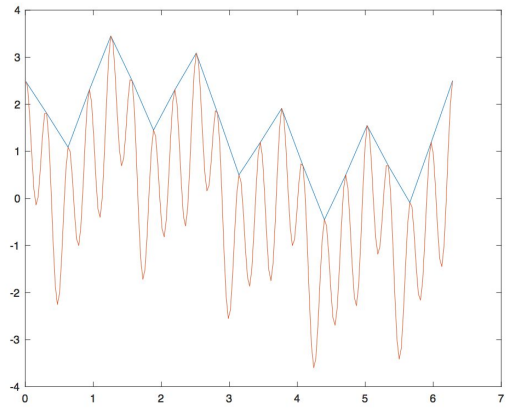
```
syms x y
eqn1 = x + y == 72;
eqn2 = 2*x + 4*y == 200;
sol = solve([eqn1, eqn2], [x, y]);
xSol = sol.x;
ySol = sol.y;
disp(xSol)
disp(ySol)
```

Code and doing it by hand solved for x=44 and y=28.

Problem 2.

n=3 is a straight line because it corresponds to the values of 0, pi, and 2pi and when each of these values are plugged into sin(x) they produce a result of 0. This makes the coordinates (0,0), (pi,0), and (2pi,0).

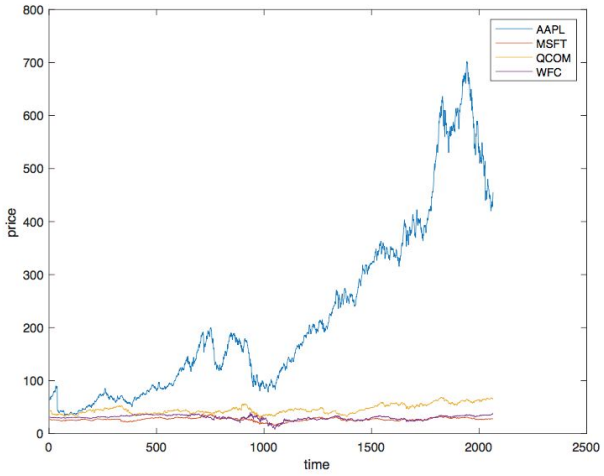




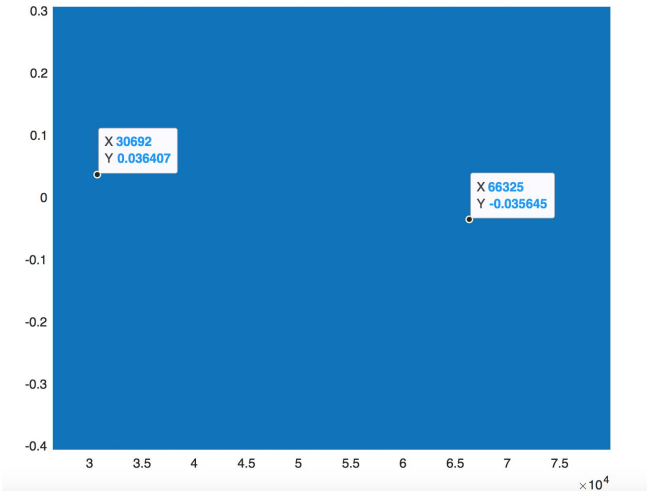
In the second graph it appears to be a sinusoidal function altering with the max amplitude of an equation acting as a sort of ceiling. It very much resembles a mountain range.

Problem 3.

My similarity calculation seemed to say QCOM was the most similar to AAPL, and the graph shows that they aren't very similar but that QCOM is definitely closer in similarity than MSFT and WFC.

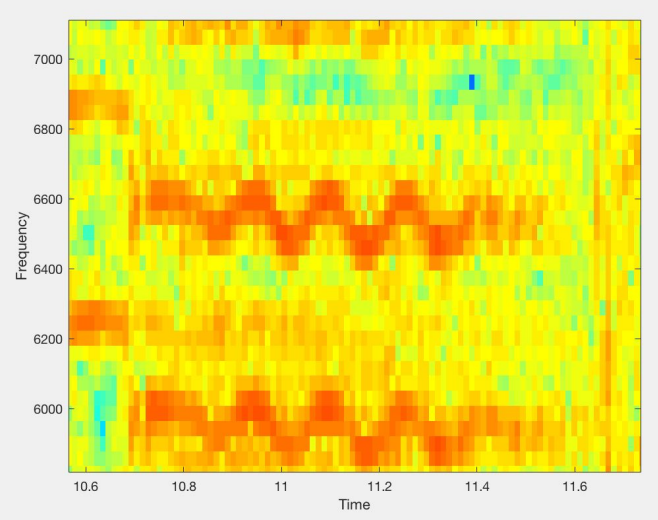


Problem 4.

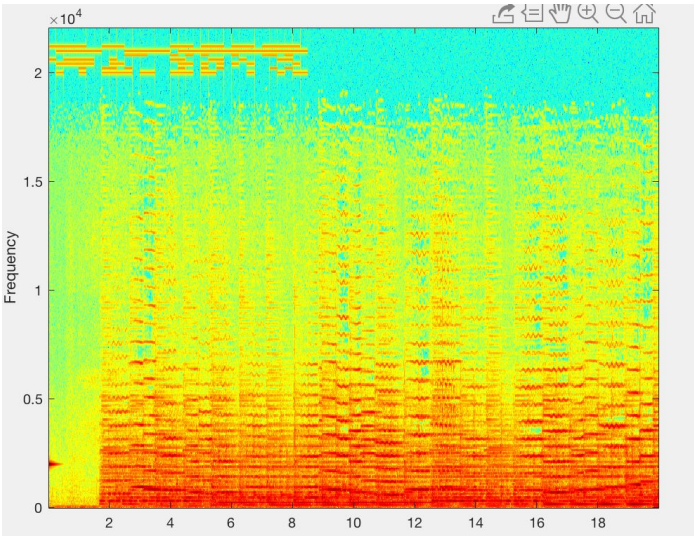


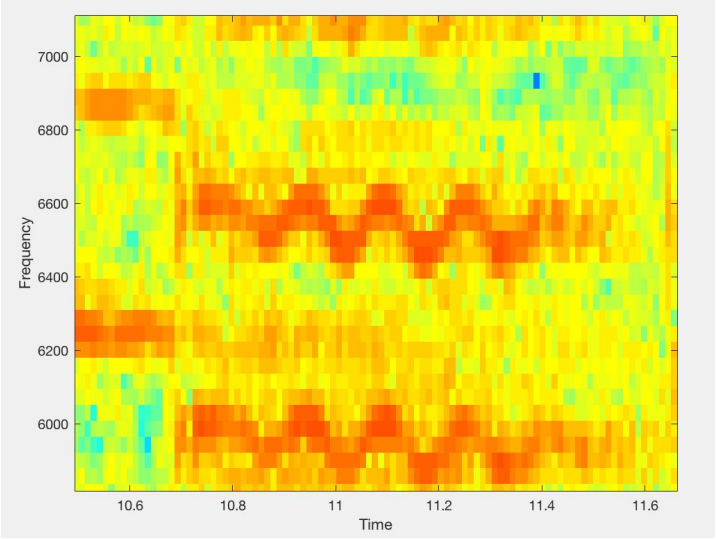
(1)

(2) The spectrogram is mostly a greenish, yellow, with a hint of blue. However there are 2 separate wave like features with a red-orangish coloration. I believe the tone that sounds like a beep and the violin's frequency matched up causing this. I believe it would sound very sharp with minute fluctuations when the violin and the tone's frequencies match up



(3) At first the audio is painful to listen to and sounds like the beep from an alarm played over a snippet of someone playing the violin. After the filter the tone goes away and the sound of the violin becomes clear and the sound quality overall is less jumbled. It took about 4-5 seconds before I could not notice the noise anymore




7000
6800
6600
6400
6200
6000
Frequency
10.6
10.8
11
11.2
11.4
11.6
Time