```
% EE 261
% PSET 2
% Noor Fakih
clear all; close all;

load PianoChords.mat
 soundsc(chord1, fs);
 soundsc(chord2, fs);
```

Part A

```
C = freq(1);
E = freq(5);
G = freq(8);

T = 5;
```

Note: Middle C

```
[c_an,c_bn] = FindFourierCoeff(C, chord1, T, t);

display(c_an);
```

```
c_an = 1.0002
```

```
display(c_bn);
```

```
c_bn = 2.6398e-04
```

```
mag = sum(c_an.^2) + sum(c_bn.^2);
display(mag);
```

```
mag = 1.0003
```

Note: E

```
[e_an,e_bn] = FindFourierCoeff(E, chord1, T, t);

display(e_an);
```

```
e_an = 2.4579e-04
```

```
display(e_bn);
```

```
e_bn = 1.0005
```

```
mag = sum(e_an.^2) + sum(e_bn.^2);
display(mag);
```

```
mag = 1.0010
```

Note: G

```
[g_an,g_bn] = FindFourierCoeff(G, chord1, T, t);

display(g_an);
```

```
g_an = -0.7075
```

```
display(g_bn);
```

```
g_bn = -0.7075
```

```
mag = sum(g_an.^2) + sum(g_bn.^2);
display(mag);
```

```
mag = 1.0011
```

Part B

```
chord_freqs = [];
an_list = [];
bn_list = [];
chord = chord2;
for i = 1:length(freq)
    [an, bn] = FindFourierCoeff(freq(i), chord, T, t);
    if (IsMag(an, bn) == 1)
        chord_freqs = [chord_freqs i];
        an_list = [an_list an];
        bn_list = [bn_list bn];
    end
end

display(chord_freqs);
```

```
chord_freqs = 1×3
     6     9    13
```

```
display(an_list);
```

```
a_coeff = 1×3
    0.7069   -0.9989    0.0005
```

```
display(bn_list);
```

```
b_coeff = 1×3
   -0.7062    0.0001    0.9997
```

Chord2 is compromised of

F: an = 0.7069 bn = -0.7062

G#/A flat: an = -0.9989 bn = 0.0001

Tenor C: an = 0.0005 bn = 0.9997

Functions

```
function [an, bn] = FindFourierCoeff(freq, chord, T, t)
integral_a = chord.*cos(2*pi*freq*t);
integral_b = chord.*sin(2*pi*freq*t);

an = (2/T)*trapz(t,integral_a);
bn = (2/T)*trapz(t,integral_b);
end

function r = IsMag(an,bn)
    r = 0;
    if((an.^2 + bn.^2) >= 0.98)
        r = 1;
    end
end
```