Prelab 7 Q1.5

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Housekeeping

```
clc; clear; close all;
```

Constants

```
Vpp = 3.3;
VDC = 1.65;
minV = VDC - (Vpp/2);
maxV = VDC + (Vpp/2);
bits = 12;
voltages = (Vpp/2)*sin(0:0.1:2*pi) + VDC;
```

Code

```
[binDec, ~] = voltage2Bin(minV, maxV, bits, voltages)

figure
hold on
grid on
titleText = sprintf("%.0f-bit Bin vs. Array number for %.1f Vpp sine wave with
 %.2f V DC offset", bits, Vpp, VDC);
title(titleText);
stem(binDec, '.')
xlabel("Array Number")
ylabel("Bin Number")

range = maxV - minV
```

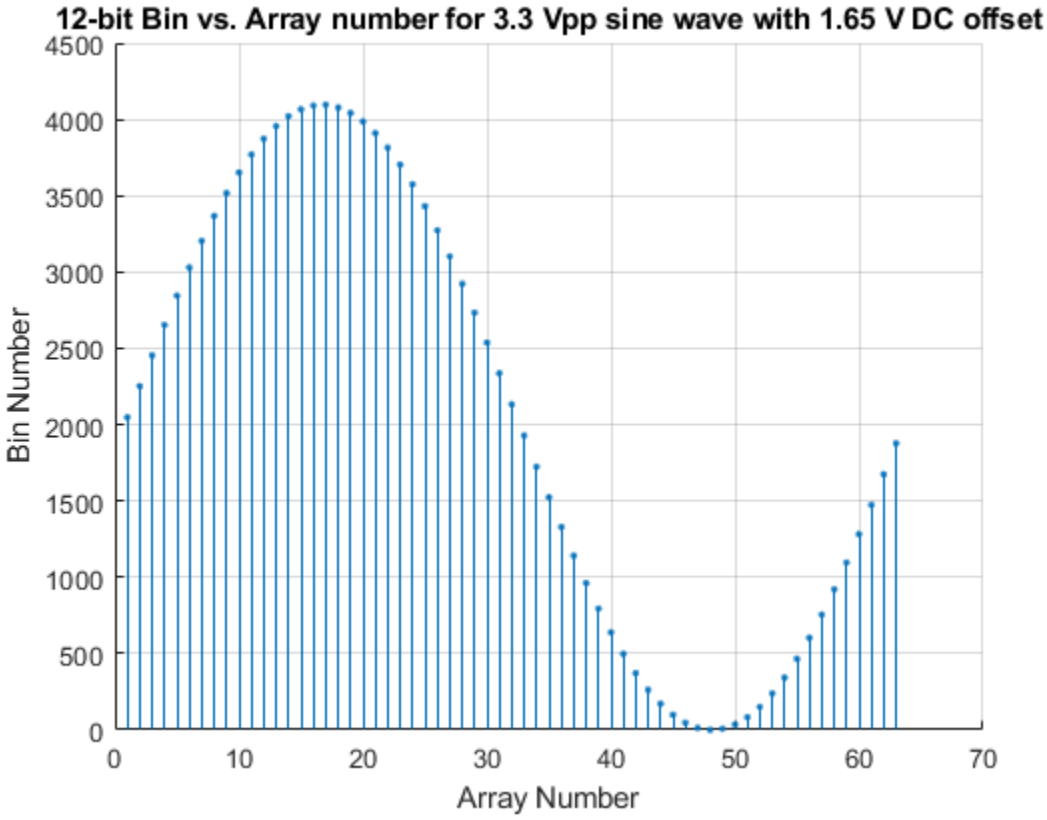
Function

```
function [binDec, binBin] = voltage2Bin(minV, maxV, bits, voltages)
% voltage2Bin: Determines the bin number, in both decimal and binary,
%              a given voltage signal would be placed in by an A/D
%              converter

range = maxV - minV;
binSize = range/(2^bits);
```

```
binDec = floor((voltages-minV)/binSize);
binBin = dec2bin(binDec);

end
```

```
binDec =

  Columns 1 through 6

       2048        2252        2454        2653        2845        3029

  Columns 7 through 12

       3204        3367        3517        3652        3771        3873

  Columns 13 through 18

       3956        4021        4066        4090        4095        4078

  Columns 19 through 24

       4042        3986        3910        3815        3703        3575

  Columns 25 through 30

       3431        3273        3103        2923        2734        2537

  Columns 31 through 36

       2337        2133        1928        1724        1524        1329

  Columns 37 through 42

       1141         962         794         639         498         372

  Columns 43 through 48

        263         171          99          46          12           0

  Columns 49 through 54

          7          35          84         151         238         343

  Columns 55 through 60

        465         603         755         920        1096        1282

  Columns 61 through 63

       1475        1674        1877
```

```
range =

    3.3000
```



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