
Prelab 7 Q1.4

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Housekeeping

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

Constants

```
minV = 0;  
maxV = 3.3;  
voltages = 0:0.25:3.25;
```

4 bits

```
bits = 4;  
[binDec4, binBin4] = voltage2Bin(minV, maxV, bits, voltages);  
  
figure  
hold on  
grid on  
titleText = sprintf("Bin number vs. Voltage for %.0f-bit ADC", bits);  
title(titleText);  
stem(voltages, binDec4, '.')  
xlabel("Voltages [V]")  
ylabel("Bin Number")
```

8 bits

```
bits = 8;  
[binDec8, binBin8] = voltage2Bin(minV, maxV, bits, voltages);  
  
figure  
hold on  
grid on  
titleText = sprintf("Bin number vs. Voltage for %.0f-bit ADC", bits);  
title(titleText);  
stem(voltages, binDec8, '.')  
xlabel("Voltages [V]")
```

```
ylabel("Bin Number")
```

12 bits

```
bits = 12;
[binDec12, binBin12] = voltage2Bin(minV, maxV, bits, voltages);

figure
hold on
grid on
titleText = sprintf("Bin number vs. Voltage for %.0f-bit ADC", bits);
title(titleText);
stem(voltages, binDec12, '.')
xlabel("Voltages [V]")
ylabel("Bin Number")
```

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
```

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