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%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% ENGR 132
% Program Description
%You work for an audio company which is designing new headphones, and
%associated volume control systems. You must analyze the data from two
%prototype heaphone designs.
%
% Assigment Information
%   Assignment:     PS 03, Problem 2
%   Author:         Ethan Hotson, ehotson@purdue.edu
%   Team ID:        009-01
%   Contributor:    None
%   My contributor(s) helped me:
%     [ ] understand the assignment expectations without
%         telling me how they will approach it.
%     [ ] understand different ways to think about a solution
%         without helping me plan my solution.
%     [ ] think through the meaning of a specific error or
%         bug present in my code without looking at my code.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

INITIALIZATION

```
headphoneData=csvread('Data_volume_power.csv',2,0);
headphonePower=headphoneData(:,1);
oep4Volume=headphoneData(:,2);
iep3Volume=headphoneData(:,3);
```

CALCULATIONS

```
oep4CalcVol=67.1*(log10(headphonePower))-1.3;
iep3CalcVol=77.7*(log10(headphonePower))-7.3;
```

FORMATTED FIGURE

```
figure(1)
hold all
title('Actual Versus Calculated Volumes at Different Power Settings')
xlabel('Power in milliwatts (mW)')
ylabel('Volume in decibels (dB)')
grid on
plot(headphonePower,oep4Volume,'xr-')
plot(headphonePower,iep3Volume,'*g--')
plot(headphonePower,oep4CalcVol,'ob-.')
plot(headphonePower,iep3CalcVol,'+m:')
legend('OEP4','IEP3','OEP4 Calculated','IEP3
 Calculated','Location','southeast')
```

ANALYSIS

-- Q1

The model for calculated volume in relation to power for the IEP3 prototype is most accurate, as it most closely follows its dataset.

-- Q2

IEP3 seems to have the highest sensitivity, as it gradually gains a higher volume level than OEP4 at the same power levels, in both the actual data and computational models shown in the graph. Though OEP4 is intially slightly more sensitive, IEP3 is more sensitive over the largest area of the data.

-- Q3

At 30dB, OEP4 requires slightly less power according to predictions and actual test data, so it would have a longer battery life due to slightly lower power consumption. At 60dB however,IEP3 has a much lower power requirement, nearly 1 milliwatt less than OEP4. Therefore, IEP3 would have the longest battery life at 60dB.

ACADEMIC INTEGRITY STATEMENT

I have not used source code obtained from any other unauthorized source, either modified or unmodified. Neither have I provided access to my code to another. The script I am submitting is my own original work.

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