

## Homework Assignment 1B

- a. Go to the Physiobank ATM at this address: <http://physionet.org/cgi-bin/atm/ATM>. Select the PTB Diagnostic ECG Database, and one of the patient records. A description of the PTB database can be found here: <http://physionet.org/physiobank/database/ptbdb/>, and a list of the healthy control signals may be found here: <http://physionet.org/physiobank/database/ptbdb/CONTROLS>. Download 10 seconds of the signal, starting from anywhere within the signal. Note: in the Toolbox, select "Export signals as CSV" and then under the blue bar, click [samples.csv](#). This should give you the 12 standard leads in a spreadsheet.
- b. Process the lead I, II, and III columns to have a mean near zero by subtracting the mean over every half-second. Alternatively, you may apply a high-pass filter with a cutoff frequency around 0.1 Hz.
- c. Use two of the leads and MATLAB to create a polar plot of the axis of the heart as it changes over time. You will need to take account of the angle of each of the leads with respect to the body. If you like, you may choose a smaller segment (fewer heartbeats) to make your plot look cleaner.
- d. Use a different pair of leads to create a new polar plot. Compare the two polar plots you have created, and suggest two reasons why the plots might be different.

### Notes

If you prefer, you may use a signal from an unhealthy heart. To do so, go to the database page, <http://physionet.org/physiobank/database/ptbdb/>, and select a patient whose number is not on the controls list. Each folder contains a .hea file that describes the patient's conditions.

There is a POLAR command in MATLAB that can create the appropriate plot.