HOMEWORK 12

GIVEN MONDAY DEC. 1, 1997, DUE FRIDAY DEC. 19, 1997

1. Copy the files hilo.d and honolulu.d from the class web page. They contain tide gauge readings (monthly average values in mm) from Hilo and Honolulu harbors, respectively. It is believed that the observations represent the sum of two phenomena: (1) eustatic sea-level variations, and (2) tectonic subsidence of the islands.

   a) Plot the data. Use regress_ls to determine the regression lines for the two series. Superpose these lines on the graphs, and label the plots with the values of the regression slope. What do these slopes represent?

   b) Assuming Oahu is stable, what is the tectonic subsidence rate at Hilo?

   c) Alternatively, we only use the time period the two data series have in common and directly subtract the Honolulu series from the Hilo series. What is the tectonic subsidence rate based on these differences, and how does it compare to your answer in b)?

   d) Remove the trends from the data. Use dft.m (type help dft) to get the amplitudes $a$ and $b$ for each series. Make a plot of the raw power spectrum for each time-series, using periods rather than frequency as $x$-axis (Skip the 0-frequency which represents the infinite period). What is the Nyquist period?

   e) What are the dominant periods in the data? How well do the two series agree on this issue (a qualitative answer is fine).