ENEL 563 Biomedical Signal Analysis

Fall 2008

Assignment 4

1. Consider Equation 3.101 in the textbook.

(a) What do the items in the equation represent?

(b) Suppose that you are hired to design a Wiener filter to suppress noise in a database of ECG signals. How would you derive the information required to design the Wiener filter? Explain all steps required to implement your solution or advice.

(c) Explain how the equation characterizes the frequency response of the Wiener filter. In particular, explain how the response varies (i) when the signal component at a particular frequency is zero, (ii) when the noise component at a particular frequency is zero, and (iii) when the noise component at a particular frequency is much stronger that the corresponding signal component.

(6 marks)

2. Consider Equation 3.108 in the textbook.

Explain how minimizing $E[(e^2(n)]$

(a) minimizes the output noise power;
(b) makes the output result in an estimate of the desired signal;
(c) maximizes the output signal-to-noise ratio.

(4 marks)

Total marks: 10.

Due date: 4:00 PM, Friday, 21 November, 2008, in the box for ENEL 563, 2nd floor, ICT building.