Heriot-Watt University
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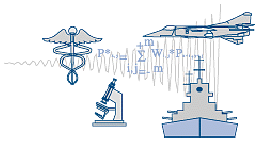

Tutorial 3

Digital Signal Processing

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1. What assumption is made of a signal being analysed using a DFT? What problems can this assumption cause and under what conditions do they occur?

2. With the aid of an appropriate diagram show how spectral estimates of long data records can be performed.

3. Give two approaches to calculating power spectral density, explaining how they differ.

4. What is spectral leakage and under what conditions does it occur?

5. What techniques can be employed to reduce the problem of spectral leakage and what disadvantages do these techniques have?
   Calculate the values for a Hamming window for a sequence of length N=9.

6. You can attempt the following problems from The Schaum's Outlines on Digital Signal Processing:

   Chapter 1: Linear Time Invariant Systems:
   1.1 1.3 1.7 1.21 1.26 1.30 1.36
   Chapter 3: Sampling
   3.1 3.2 3.6 (a) 3.8
   Chapter 6: DFT
   6.2 6.4 6.8 6.10
   Chapter 7: FFT
   7.1 7.4 7.9