Course 2E02 2013 (SF Engineers & MSISS & MEMS)

Sheet 8

Due: at the end of the tutorial

Exercise 1
Find the Fourier series of the function

\[ f(x) = \begin{cases} 
1 & \text{if } -\pi \leq x < 0 \\
-2 & \text{if } 0 \leq x \leq \pi , 
\end{cases} \quad -\pi \leq x \leq \pi. \]

Exercise 2
Which systems of functions are orthogonal with respect to the inner product

\[ \langle f, g \rangle = \int_{-\pi}^{\pi} f(x)g(x) \, dx : \]

(i) \{1, x, -\cos x\};
(ii) \{1, -\sin \frac{x}{2}, \sin 2x\};
(iii) \{1, -x, x^2\}.