## Course 2E02 2012 (SF Engineers & MSISS & MEMS)

Due: at the end of the tutorial

## Exercise 1

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

$$\langle f,g
angle = \int_{-\pi}^{\pi} f(x)g(x)\,dx:$$

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

## Exercise 2

Identify even and odd functions and find their Fourier series for  $-\pi \le x \le \pi$ :

(i) 
$$f(x) = x^2$$
;  
(ii)  $f(x) = \begin{cases} -x \text{ if } -\pi \le x < 0 \\ x \text{ if } 0 < x \le \pi. \end{cases}$