Tough Nut to Crack – Integration III:

To be submitted by midday Thursday 2nd April 09.
The prize is 'Further Engineering Mathematics' by Ken Stroud which is a book recommended on second year Mathematical Techniques 2 module. [This book is an older edition].

Let *m* and *n* be integers. Show that

$$\int_0^{2L} \sin\left(\frac{m\pi x}{L}\right)\cos\left(\frac{n\pi x}{L}\right)dx = 0$$

We say these integrands, $\sin\left(\frac{m\pi x}{L}\right)$ and $\cos\left(\frac{n\pi x}{L}\right)$, are orthogonal on the interval $[0,\ 2\pi]$.