4.1 Consider the functions f(x) = 1 and g(x) = x defined on the interval [0, 1].

- (i) Compute the Fourier sine series of f and g. Plot the partial sum of these series together with the odd extensions of f and g on the interval [-1, 1].
- (ii) Compute the Fourier cosine series of f and g. Plot the partial sum of these series together with the even extensions of f and g on the interval [-1, 1].
- (iii) Compare the results you obtained in (i) and (ii) separately for f and g.

You can use MAPLE for producing these plots.

4.2 By writing $u = R(r)\Theta(\theta)$, where (r, θ) are plane polar coordinates, find the general solution of

$$\Delta u = 0$$

in the domain

$$A = \{ (r, \theta) : \ a < r < b, \ 0 \le \theta \le 2\pi \}.$$

(Here, a and b are positive constants.)