

**Math 2080: Differential Equations**  
**Worksheet 6.3: Fourier sine and cosine series**

**NAME:**

1. Consider the function defined by  $f(x) = 1$  on  $[0, \pi]$ .
  - (a) Sketch the even extension of  $f(x)$  and compute the Fourier cosine series.

- (b) Sketch the odd extension of  $f(x)$  and compute the Fourier sine series.

2. Consider the function defined on  $[0, \pi]$  by  $f(x) = x(\pi - x)$ . Sketch the even extension of this function and compute its Fourier cosine series. The following indefinite integral will be needed:

$$\int x(\pi - x) \cos(nx) dx = \frac{(n^2(\pi - x)x + 2) \sin nx + n(\pi - 2x) \cos nx}{n^3} + C.$$