

## 1 Taylor series approximation for cosine

A Taylor series can be used to create an approximation for a function, which we call a *power series approximation*. The Taylor series for cosine is:

$$\cos(\theta) = \sum_{i=0}^{\text{even}} \frac{(-1)^{i/2}}{i!} \theta^i \quad (1)$$

where the sum goes to  $\infty$  over even values of  $i$ .

- (a) Write a function that given  $\theta$  and  $i_{\max}$  computes the Taylor series of  $\cos \theta$  including the terms up to and including  $i = i_{\max}$ .
- (b) Test your function by printing  $\cos(0.01)$  and a few approximations of this with moderate  $i_{\max}$ . Save these tests as part of your program.
- (c) Plot  $\cos \theta$  and be sure to label your axes.
- (d) Plot your Taylor series approximation for  $i_{\max}$  of 0, 1, 2, and 3. Use a legend to distinguish between your curves.