Calculators (and Matlab) can calculate the values of the trigonometric functions (sine, cosine, etc...), exponentials and logarithms. To do this, they use something called the Taylor expansion (of a function). With this expansion, a function can be expressed in terms of powers of its argument. For example:

$$
\begin{aligned}
sin(x) &= x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + ... \\
&= \sum_{n=1}^{\infty} \frac{(-1)^{2n-1} x^{2n-1}}{(2n-1)!} \\
cos(x) &= 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} ... \\
&= \sum_{n=0}^{\infty} \frac{(-1)^{2n} x^{2n}}{(2n)!}
\end{aligned}
$$

Using these expressions, we can compare against the Matlab built-in trigonometric functions sin(x) and cos(x).

Exercise:
Evaluate

$$
\begin{aligned}
sin_N(x) &= \sum_{n=1}^{N} \frac{(-1)^{2n-1} x^{2n-1}}{(2n-1)!} \\
cos_N(x) &= \sum_{n=0}^{\infty} \frac{(-1)^{2n} x^{2n}}{(2n)!}
\end{aligned}
$$

for $x = pi/3$. Find the N such that you get the same result as the Matlab built-in functions give. That is, until $sin_N(x) - sin(x) = 0$ and $cos_N(x) - cos(x) = 0$.