# TI Lab 3: Maxima, Minima, Inflections

In this lab, you will: find better approximations for the maximum and minimum of a function; and use a program to determine points of inflection.

**1.** As you know, the maximum and minimum values of a function can be found by using `max` or `min` from the `CALC` menu. These values, though easy to find, aren't as exact as they could be. The first derivative test gives us another way to calculate extreme values: we graph the derivative and determine its zeros.

Graph $y = \dfrac{\sqrt{4+x^2}}{3} + \dfrac{10-x}{4}$ and its derivative (remember, you do not have to find the derivative in order to graph it). Use the `min` function to find the minimum of $y$, then use the `zero` function to find the zero of the derivative. Which is more exact? Use your table on `Indpnt:Ask` to find out.

**2.** The program `INFLECPT` will locate inflection points on a graph. The program uses `nDeriv` twice—it simply looks for zeros of the second derivative. This program needs you to tell it where to start looking for the inflection point. So it asks for left and right bounds, just like `max`, `min`, or `zero` functions.

a) Use `INFLECPT` to find the inflection point of $y = x^3 - 2x^2 - 4x + 3$.

b) Find the inflection points of $y = x^3 + x^2 + x + e^{-x}$.

c) Determine the intervals where $y = e^{x/2} - \ln(x^3+1)$, for $x > -1$, is increasing, decreasing, concave up, and concave down. Use the window $-1 \le x \le 4$ and $-2 \le y \le 3$.