1. (15 points) Sketch a curve so that the slope is always positive and decreasing.

2. (25 points) Find the absolute maximum and minimum values of the function
   \[ f(x) = x - 2 \cos x \]
   on the interval \([-\pi, \pi]\).

3. (25 points) Find the dimensions of the rectangle of largest area that has its base on the \(x\)-axis and its other two vertices above the \(x\)-axis and lying on the parabolic \(y = 8 - x^2\).

4. (35 points) For the function \(f(x) = 2x + \cot x\), \(0 < x < \pi\),
   (a) Find the intervals on which \(f\) is increasing or decreasing.
   (b) Find the local maximum and minimum values of \(f\).
   (c) Find the intervals on which \(f\) is concave up or concave down, and find the inflection points.