1. Determine whether the function f satisfies the hypothesis of the Mean Value Theorem on $[0, 2\pi]$, and if so, approximate the number(s) c to 5 decimal places that satisfy the conclusion of the theorem.

$$f(x) = \left(x^2 - x - 6\right)\cos(x)$$

2. Determine all local extrema of g (and classify) in the interval $[1, 5]$ to the nearest thousandth. Also, determine the absolute extrema (and classify) in $[1, 5]$.

$$g(x) = \left(x^2 - x - 6\right)\sqrt{\cos^2(x)}$$

3. Assume a particle is moving within a linear tube where its position (in meters) at a given point in time (in seconds) is given by the function

$$s(t) = 3t^4 - 45t^3 + 190t^2 - 176t + 40 \text{ for } t \in [0, 7]\,.$$

   (a) Find the time, position, and velocity when the velocity is maximized. Also, find the time, position, and velocity when the velocity is minimized.

   (b) Find the time and position when the speed of the particle is maximized.

4. An ordinary pop can has a volume of 355 cubic centimeters. Assume the thickness of the top is three times thicker than the sides and bottom. Also, assume the indentation of the bottom of the can is a hemisphere with a radius equal to the radius of the can. Find the dimensions which minimize the amount of aluminum forming the can. (Accurate to the nearest thousandth.)