NAME (please print legibly): ________________________________
Perm Number: ________________________________
Section time: ________________________________

Instructions: Solve the following 5 problems, explaining your answers as clearly as possible.
1. **(10 points)** Find the derivatives of the following functions:

   a) \( f(x) = x \cos x \)

   b) \( g(x) = x \arcsin \frac{1}{x} \)
2. (10 points) The curve described by the equation below is called The Devil’s Curve. Use Implicit differentiation to find $y'$ and use it to find the equation of the line tangent to The Devil’s Curve at the point (0, 2):

$$y^2(y^2 - 4) = x^2(x^2 - 5)$$
3. (10 points) Use The Closed Interval Method to find the absolute maximum and the absolute minimum of the following function in the given interval:

\[ f(t) = \cos t - \sin t \]

in \([0, 2\pi]\)
4. **(10 points)** A plane flying horizontally at an altitude of 2 miles and a speed of 600 miles per hour passes directly over a radar station. Find the rate at which the distance from the plane to the station is increasing when it is 3 miles away from the station.
5. (10 points) Consider the following function:

\[ f(x) = 2x^4 - 4x^2 + 6 \]

a) Find the intervals of increase and decrease of the function.
b) Find the local maximum and local minimum values.
c) Find the intervals of concavity and the inflection points.