Math 450 - Numerical Analysis
Group Assignment # 4
Due: Monday, September 17th

Name:_____

Instructions: Work together in pairs on the following problem.

1. Let $f(x) = x^4 - \sin x - 2$

   (a) Prove that $f(x)$ has a root on the interval $[1, 2]$.

   (b) Find the recursive formula for applying Newton's Method to $f(x)$.

   (c) Carry out enough iterations of Newton's Method to approximate the root of $f(x)$ in $[1, 2]$ to at least 4 decimal places of accuracy. Use $p_0 = 1.5$ as your initial approximation. [You don't need to show detailed work.]

   (d) Replace $f'(x)$ in the recursive formula for Newton's Method in order to find the Secant Method recursive formula for finding roots of $f(x)$.

   (e) Carry out enough iterations of The Secant Method to approximate the root of $f(x)$ in $[1, 2]$ to at least 4 decimal places of accuracy. Use $p_0 = 1$ and $p_1 = 2$ as your initial approximations [why do we need two initial values?].

   (f) For each pair of consecutive values in the sequence you created when carrying out the Secant method, compute $f(p_i) \cdot f(p_{i+1})$ and note whether the resulting sign is positive or negative.