Math 132A Assignment 4
Due: Friday, February 7th at Midnight on Gradescope.

1. For each of the following functions, apply the SONC and SOSC to determine if the given points are local minimums.

   (a) $f(x_1, x_2) = x_1^4 + x_2^4 - 4x_1x_2$, $x^* = (0, 0)$, $x^* = (1, 1)$, and $x^* = (-1, -1)$.

   (b) $f(x_1, x_2, x_3) = x_1^2 + 2x_2^2 + 5x_3^2 - 2x_1x_2 - 4x_2x_3 - 2x_3$, $x^* = (2, 2, 1)$.

2. Let $f(x) = x^2 + \cos(x + 2)$. Starting with the interval $[0, 1]$, use the golden section method to locate an interval of width 0.05 that contains the minimizer x^*.

3. Apply the first four steps of Newton's method to find the minimum of $f(x) = x^2 + \cos(x + 2)$ starting with the initial guess $x^{(0)} = 1$.