1. Show that the function \( f(x) = x + \frac{1}{x} \) satisfies The Mean Value Theorem on the interval \([1, 2]\), and find all the numbers \( c \) in the interval \((1, 2)\) that satisfy the conclusion of that theorem.

2. Find the point \((x, y)\) on the line \(2x + y = 4\) that is closest to the point \((3, 2)\).
3. Classify the critical points of \( f(x) = \cos x + x \sin x \) in the interval \((-3, 3)\).

4. A box with a square base and an open top is to have volume 62.5 in\(^3\). Neglect the thickness of the material used to make the box, and find the dimensions that will minimize the amount of the material used.