

Section 4.1: Maximum and Minimum Values**Problem 1.**

- (a) Sketch the graph of a function that has a local maximum at 2 and is continuous, but not differentiable at 2.
- (b) Sketch the graph of a function that has a local maximum at 2 and is not continuous at 2.
- (c) Sketch the graph of a function on $[0, 4]$ that has an absolute maximum, no local maximum, and no absolute minimum.

Problem 2. Find the absolute maximum and the absolute minimum values of the function

$$f(\theta) = 1 + \cos^2(\theta)$$

in the interval $[\pi/4, \pi]$.

Section 4.2: The Mean Value Theorem

Problem 3.

- (a) Verify that the function $f(x) = 1/x$ satisfies the hypotheses of the Mean Value Theorem on the interval $[1, 3]$.
- (b) Find all numbers c that satisfy the conclusion of the Mean Value Theorem.

Problem 4. Determine whether the statements below are true or false. If the statement is true, explain why; otherwise, explain why or give an example that disproves the statement.

(a) If f is differentiable everywhere and $f(-1) = f(1)$, then there is a number c such that $|c| < 1$ and $f'(c) = 0$.

(b) If a function g satisfies $3 \leq g'(x) \leq 5$ for all values of x , then $18 \leq g(8) - g(2) \leq 30$.