Discussion Questions

**Question 1.** Let \( f(x) = x^2 - 4x + 1 \).

(a) Find critical points \( c \) of \( f \) and compute \( f(c) \).

(b) Compute values of \( f \) at the endpoints of the interval \([0, 4]\).

(c) Determine the min and max of \( f \) on the interval \([0, 4]\).

(d) Find extreme values of \( f \) on \([0, 1]\).

**Question 2.** Find the critical points of \( f(x) = \sin(x) + \cos(x) \) and determine the extreme values of \( f \) on \([0, \pi/2]\).

**Question 3.** For the following functions, find the critical points and the intervals in which the function is increasing or decreasing. Use the first derivatives test to determine whether the critical value is a local minimum or maximum (or neither).

1. \( y = x^3 - 12x^2 \)
2. \( y = \frac{2x+1}{x^2+1} \)

**Question 4.** Show that \( f(x) = x^3 - 2x^2 + 2x \) is an increasing function. Hint: find the minimum value of \( f' \).

**Homework questions:**

4.2.12, 4.2.56, 4.3.27, 4.3.41, 4.3.51