

Lesson 9 Practice Problems

Applications of the Derivative

MATH 2200-98

Linear Approximation & Differentials

1. Find the linear approximation to $f(x) = 3xe^{2x-10}$ at $x = 5$.
2. Compute dy and Δy if $y = \cos(x^2 + 1) - x$ as x changes from $x = 2$ to $x = 2.03$.
3. The sides of a cube are found to be 6 feet in length with a possible error of no more than 1.5 inches. What is the maximum possible error in the volume of the cube if we use this value of the length of the side to compute the volume?

Optimization

4. Find two numbers whose difference is 100 and whose product is a minimum.
5. A square-based, box-shaped shipping crate is designed to have a volume of 16 ft^3 . The material used to make the base costs twice as much per square foot as the material in the sides, and the material used to make the top costs half as much per square foot as the material in the sides. What are the dimensions of the crate that minimize the cost of materials?
6. What is the shortest possible length of the line segment that is cut off by the first quadrant and is tangent to the curve $y = \frac{3}{x}$ at some point?