ASSIGNMENT 16

Preparing for Exam 2

Topics on the exam

Differentiation: Sections 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8 of Smith–Minton. Typical problems might be:

- Compute $\frac{d}{dx}\left[e^{-2x}\sin(x)\right]$
- Compute the derivative of $f(x) = \tan^{-1}(x^2)$.

Optimization and curve sketching: Sections 3.3, 3.4, 3.5, 3.6, 3.7 of Smith–Minton. Typical problem might be:

- Consider the function $f(x) = xe^{-x^2}$. Find all roots, critical points, and inflection points. Determine where the function is increasing/decreasing, concave up/down. Find local minimum/maximum points. Sketch the graph of the function.

Related rates and geometric optimization: Sections 3.7 and 3.8 (see also 3.9) of Smith–Minton. Typical problems might be

- Consider a cone where the base has radius r and where the height is h, and where both are changing in time. Suppose also that the volume of the cone is always 10. If at some moment the radius of the cone is 2 and the rate of change of the radius is 5, what is the rate of change of the height at that moment?
- (Famous three-sided fence problem) Suppose I am building a rectangular fenced area for my urban free-range chickens. To save resources, one side of the area will be the wall of my house; the remaining three sides I will build out of reclaimed pallets. I have enough pallets for 30 feet of fencing. What is the largest region I can enclose? Please provide the width and length of the region so that I know how to build it!