

## MAC 2311 STUDY GUIDE FOR THE FINAL

- 1.) Product Rule, Quotient Rule and Chain Rule (Reference: Homework assignments pertaining to Sections 3.2, 3.3. and 3.4.)
- 2.) Derivatives of inverse trigonometric functions. (Reference: Exercises 19, 21 and 39 on page 180.)
- 3.) An applied problem on optimization. (Reference: Handout on optimization; Problem 20 on page 266.)
- 4.) Find the intervals on which a given function  $f(x)$  is increasing/decreasing. Locate the relative maximum/minimum points of  $f(x)$ . (Reference: Examples 2 and 3, on pages 222–223; Exercises 5, 19, 21, 29, 35, 39, 45, on page 226.)
- 5.) Find the intervals on which the graph of a given function  $f(x)$  is concave upward/downward and find all inflection points for the graph of  $f(x)$ . (Reference: Examples 2, 3 on page 232–233; Exercises 11, 13, 19, 27 on page 235.)
- 6.) Use calculus to **analyze a given function  $f$  and sketch its graph**. You will be asked to find the domain of  $f$ , find  $x$ -intercepts and  $y$ -intercepts of  $f$ , find the intervals on which  $f$  is increasing/decreasing, find the points at which local maxima/minima of  $f$  occur, find the intervals on which  $f$  is concave up/down, find inflection points of  $f$ , find vertical and horizontal asymptotes of  $f$  (if any), and sketch the graph of  $f$ . If a function is complicated (like the one in Example 1 on page 250), I will provide the answers for  $f'(x)$  and  $f''(x)$ . However, you will need to construct the sign charts for  $f'(x)$  and  $f''(x)$  and perform the rest of the analysis. (Reference: Example 1 on page 250 and Example 5 on page 253).
- 7.) Find definite integrals using Fundamental Theorem of Calculus. You must be able to work with various types of functions: power functions, trigonometric functions, and exponential functions. (Reference: Homework pertaining to Section 5.4.)
- 8.) Set up and calculate the integral for the area of a region in the  $xy$ -plane. (Reference: Exercises 45, 47, 49 and 50 on page 327.)
- 9.) Carefully state Rolle's Theorem and Mean Value Theorem. (Reference: Theorem 4.3 on page 212 and Theorem 4.4 on page 214.)