

## MAC 2313 FINAL EXAM STUDY GUIDE

- 1.) Find first and second partial derivatives of a function  $f(x, y)$ . (Reference: Examples 1–4 and 6–8 on pages 906–911; homework for Section 13.3; Quiz 5.)
- 2.) Gradient, directional derivative and their properties. (Reference: Examples 1–5 on pages 931–936; Quiz 6.)
- 3.) Find an equation of the tangent plane to a surface at the given point. (Reference: Examples 1–3 on pages 943–946; Homework for Section 13.7.)
- 4.) (i) Find critical points of a function  $f(x, y)$ . (ii) Use the second derivative test to classify the critical points. (Reference: Examples 1 and 3 on pages 954–956; examples done in class; Homework for Section 13.8.)
- 5.) Using  $xy$ -coordinates, set up and calculate a double integral over a region  $\mathcal{R}$  in the  $xy$ -plane. You should be able to handle the two types of regions discussed in class. (Reference: Homework for Section 14.2; Quiz 7.)
- 6.) Given a (double) iterated integral, sketch the corresponding region of integration, interchange the order of integration (from  $dx dy$  to  $dy dx$ , or from  $dy dx$  to  $dx dy$ ), and calculate the new integral. (Reference: Exercises 49–52 on page 999; Quiz 7.)
- 7.) Use polar coordinates to set up and evaluate a double integral. (Reference: Example 2 on page 1003; Homework for Section 14.3 and Quiz 8.)
- 8.) Using  $xyz$ -coordinates, set up a triple integral for the **volume** of a given solid. You should be able to sketch the solid, so review sketching basic surfaces. (Reference: Example 4 on page 1028; Homework for Section 14.6; Quiz 8; Handout on sketching basic surfaces.)
- 9.) Using cylindrical coordinates, set up and calculate a triple integral for the **volume** of a given solid. You should be able to sketch the solid. (Reference: Homework for Section 14.7 (part1) **from the book and the handout given in class**; Quiz 9; Handout on sketching basic surfaces.)
- 10.) Using spherical coordinates, set up and calculate a triple integral for the **volume** of a given solid. You should be able to sketch the solid. (Reference: Example 4 on page 1039; Homework for Section 14.7 (part

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2) **from the book and the handout given in class;** Handout on sketching basic surfaces.)