MATH 2400, Review suggestions for the third midterm

Dear students,

   The second midterm exam is on Monday, April 11 from from 5:15pm to 6:45pm in MATH 100. The exam covers Sections 12.4–13.4 of the textbook. Here are some suggestions for review of the material.

   Spend some time on the Concept Check and True-False Quiz (pg. 899-900, 974) and the most time on the Exercises. Make sure you understand the formulas and theorems from the textbook highlighted in the $\boxed{\text{red boxes}}$. If you struggle with anything or need to look at the answer before you solve it, make sure you then practice more similar problems until you can do it on your own. Then practice with some of the old exams from the course web page.

   Below is a list of typical problems from each section. The list is not meant to be exhaustive but if you master these tasks you should do well on the exam.

CHAPTER 12: MULTIPLE INTEGRALS

Section 12.4: Double Integrals in Polar Coordinates.
- Compute a double integral by changing to polar coordinates.
  $\boxed{2, 3}$ **EXAMPLE 1** *pg. 857 #11, 14, 29*
- Find the volume of a solid best described in polar coordinates.
  EXAMPLES 2, 3 *pg. 900 #17, 21, 22*

Section 12.5: Applications of Double Integrals.
- Mass, center of mass, moments. $\boxed{1\text{–}5}$ **EXAMPLES 1–3** *pg. 867 #13, 15*

Section 12.6: Surface Area.
- Area of a parametric surface $\boxed{4}$ **EXAMPLE 1** *pg. 871 #7, 8*
- Surface area of a graph. $\boxed{6}$ **EXAMPLE 2** *pg. 871 #10, 13*

Section 12.7: Triple Integrals.
- Compute a triple integral. $\boxed{4\text{–}7}$ **EXAMPLES 1, 2** *pg. 880 #8, 13, pg. 881 #17*
- Choosing/changing the order of integration. $\boxed{8\text{–}11}$ **EXAMPLE 3** *pg. 881 #39, 33, 36*
- Applications. $\boxed{12\text{–}16}$ **EXAMPLES 4, 5** *pg. 881 #21, pg. 882 #39, 42, 45, 52*

Section 12.8: Triple Integrals in Cylindrical and Spherical Coordinates.
- Evaluate a triple integral using cylindrical coordinates.
  $\boxed{2}$ **EXAMPLES 1, 2** *pg. 888 #9, 11, 36*
- Evaluate a triple integral using spherical coordinates.
  $\boxed{4}$ **EXAMPLES 3, 4** *pg. 888 #20, 26, pg. 889 #37*

Section 12.9: Change of Variables in Multiple Integrals.
- Given a transformation, find the image of a set, compute the Jacobian.
  $\boxed{7, 12}$ **EXAMPLE 1, 4** *pg. 898 #4, 5, 7, 14*
- Evaluate a double/triple integral using a suitable transformation.
  $\boxed{9, 13}$ **EXAMPLES 2, 3** *pg. 898 #15, 17, 19, 25*

Chapter 13: Vector Calculus

Section 13.1: Vector Fields.

- Vector fields, examples. $\boxed{1\text{–}4}$ **EXAMPLES 1–5** *pg. 912 #5, 6, 11-14*
- Gradient field. **EXAMPLE 6** *pg. 912 #21, 23, 26*

Section 13.2: Line Integrals.

- Integrate a scalar function along a curve. $\boxed{3,7,9}$ **EXAMPLES 1–6** *pg. 922 #5, 8, 11*
- Integrate a vector field along a curve. $\boxed{13}$ **EXAMPLES 7, 8** *pg. 923 #21, 26*
- Application: mass, center of mass. $\boxed{4}$ **EXAMPLE 3** *pg. 923 #33, pg. 924 #36*

Section 13.3: The Fundamental Theorem for Line Integrals.

- Decide if a vector field is conservative. $\boxed{5,\,6}$ **EXAMPLES 2, 3** *pg. 932 #5, 7, 8*
- Find a potential function of a conservative field, use it to evaluate a line integral. $\boxed{2,\,3,\,4}$ **EXAMPLES 4, 5, 1** *pg. 932 #11, 13, 20, 23*

Section 13.4: Green's Theorem.

- Use Green's Theorem to evaluate a line integral. $\boxed{\text{Green's Theorem}}$ **EXAMPLES 1, 2, 4, 5** *pg. 940 #4, 7, 12, 18*
- Area of a region enclosed by a curve. $\boxed{5}$ **EXAMPLE 3** *pg. 940 #19*