

MA 26100 Exam 2, Spring 2014

Name _____

10 digit PUID number _____

Recitation Instructor _____

Recitation Section Number and Time _____

Instructions: MARK TEST NUMBER 01 ON YOUR SCANTRON

1. Do not open this booklet until you are instructed to.
2. Fill in all the information requested above and on the scantron sheet. On the scantron sheet fill in the little circles for your name, section number and PUID.
3. This booklet contains 10 problems, equally weighted.
4. For each problem mark your answer on the scantron sheet and also **circle it in this booklet**.
5. Work only on the pages of this booklet.
6. Books, notes, calculators or any electronic device are not allowed during this test and they should not even be in sight in the exam room. You may not look at anybody else's test, and you may not communicate with anybody else, except, if you have a question, with your instructor.
7. You are not allowed to leave during the first 20 and the last 10 minutes of the exam.
8. When time is called at the end of the exam, put down your writing instruments and remain seated. The TAs will collect the scantrons and the booklets.

Exam Policies

1. Students must take pre-assigned seats and/or follow TAs' seating instructions.
2. Students may not open the exam until instructed to do so.
3. No student may leave in the first 20 min or in the last 10 min of the exam.
4. Students late for more than 20 min will not be allowed to take the exam; they will have to contact their lecturer within one day for permission to take a make-up exam.
5. After time is called, the students have to put down all writing instruments and remain in their seats, while the TAs will collect the scantrons and the exams.
6. Any violation of the above rules may result in score of zero.

Rules Regarding Academic Dishonesty

1. You are not allowed to seek or obtain any kind of help from anyone to answer questions on the exam. If you have questions, consult only your instructor.
2. You are not allowed to look at the exam of another student. You may not compare answers with anyone else or consult another student until after you have finished your exam, handed it in to your instructor and left the room.
3. You may not consult notes, books, calculators. You may not handle cell phones or cameras, or any electronic devices until after you have finished your exam, handed it in to your instructor and left the room.
4. Anyone who violates these instructions will have committed an act of academic dishonesty. Penalties for academic dishonesty can be very severe and may include an F in the course. All cases of academic dishonesty will be reported immediately to the Office of the Dean of Students.

I have read and understand the exam policies and the rules regarding the academic dishonesty stated above:

STUDENT NAME: _____

STUDENT SIGNATURE: _____

MA261 Spring 2014 Exam 2

1. Use the method of Lagrange multipliers to find the maximum value of $f(x, y) = x + 3y$ subject to the constraint $x^2 + y^2 = 30$.

- A. $4\sqrt{2}$
- B. $10\sqrt{2}$
- C. $6\sqrt{3}$
- D. $10\sqrt{3}$
- E. $3\sqrt{10}$

2. Evaluate the integral

$$\int_0^{\sqrt{2}} \int_{-3}^3 \frac{xy^2}{x^2 + 1} dy dx.$$

- A. $6 \ln 3$
- B. $9 \ln 3$
- C. $12 \ln 3$
- D. $18 \ln 3$
- E. $27 \ln 3$

3. Evaluate $\int_0^2 \int_x^2 e^{y^2} dy dx$ by reversing the order of integration

- A. $2(e^4 - 1)$
- B. $e^4 - 1$
- C. $\frac{e^4 - 1}{2}$
- D. $\frac{e^4}{2}$
- E. $e^4 + 1$

4. The double integral $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2(x^2 + y^2)^3 dy dx$ when converted to polar coordinates becomes

- A. $\int_0^\pi \int_0^1 r^9 \sin^2 \theta dr d\theta$
- B. $\int_0^{\frac{\pi}{2}} \int_0^1 r^8 \sin^2 \theta dr d\theta$
- C. $\int_0^\pi \int_0^1 r^8 \sin \theta dr d\theta$
- D. $\int_0^{\pi/2} \int_0^1 r^8 \sin \theta dr d\theta$
- E. $\int_0^{\frac{\pi}{2}} \int_0^1 r^9 \sin^2 \theta dr d\theta$

5. Let Σ be the part of the paraboloid $z = x^2 + y^2$ that is below $z = 4$. Evaluate the surface integral $\int_{\Sigma} (1 + 4x^2 + 4y^2)^{-1/2} dS$.

- A. $\sqrt{\pi}$
- B. $2\sqrt{\pi}$
- C. 2π
- D. 4π
- E. 16π

6. Let D be the region in the x - y plane bounded by $y = x^2$, $y = 0$, and $x = 1$. Let E be the solid region which lies above D and below the function $z = x^2 + y^2$. Find

$$\iiint_E x \, dV$$

- A. $5/24$
- B. $1/4$
- C. $7/24$
- D. $3/8$
- E. 1

7. Let K be the solid region which lies inside the cylinder $x^2 + y^2 = 4$, below the paraboloid $z = x^2 + y^2$, and above the cone $z = -\sqrt{x^2 + y^2}$. Find the volume of K .

- A. $28/3$
- B. $(40\pi)/3$
- C. $(28\pi/3)$
- D. $40/3$
- E. 20π

8. Let E be the solid region which lies inside the sphere $x^2 + y^2 + z^2 = 1$, above the plane $z = 0$, and below the cone $z = \sqrt{x^2 + y^2}$. Find the volume of E .

- A. $\pi/(3\sqrt{2})$
- B. $(2\pi)/3$
- C. $(\sqrt{2}\pi)/3$
- D. $(-\sqrt{2}\pi)/3$
- E. $\pi/3$

9. Evaluate the line integral

$$\int_C ye^x ds$$

where C is the curve that traverses the part of the circle $x^2 + y^2 = 4$ in the first quadrant in a counter-clockwise direction.

- A. $2e^2 - 2$
- B. $e^2 - 1$
- C. $e^2 + 1$
- D. $2e - 2$
- E. $2e^2$

10. Let C be the curve parameterized by $\mathbf{r}(t) = \langle t^2, t^2, t^3 \rangle$ $0 \leq t \leq 1$, and let $\mathbf{F}(x, y, z) = \langle 3x^2, e^y, xz \rangle$. Find

$$\int_C \mathbf{F} \cdot d\mathbf{r}$$

- A. $e + \frac{17}{24}$
- B. $\frac{11}{8}$
- C. $e - \frac{11}{8}$
- D. $e + \frac{3}{8}$
- E. $\frac{3}{8}$