MA261 — EXAM 1 — FALL 2015 — DATE 02/15
TEST NUMBER 01– GREEN– USE GREEN SCANTRON
ENTER YOUR STUDENT ID NUMBER AND SECTION NUMBER CORRECTLY ON THE SCANTRON

INSTRUCTIONS:

1. **Do not open the exam booklet until you are instructed to do so.**
2. This exam has 12 problems in 7 different pages (including this cover page). Once you are allowed to open the exam, make sure you have a complete test.
3. Do any necessary work for each problem on the space provided or on the back of the pages of this test booklet. Circle your answers in this test booklet.
4. Each problem is worth 8 points. 4 points will be added to your total for a maximum of 100 points. No partial credit.
5. Use a # 2 pencil to fill in the required information in your scantron and fill in the circles.
6. Use a # 2 pencil to fill in the answers on your scantron.
7. After you have finished the exam, hand in your scantron and your test booklet to your recitation instructor.

RULES REGARDING ACADEMIC DISHONESTY:

1. Do not leave the exam room during the first 20 minutes of the exam.
2. If you do not finish your exam in the first 50 minutes, you must wait until the end of the exam period to leave the room.
3. Do not seek or obtain any kind of help from anyone to answer questions on this exam. If you have questions, consult only your instructor.
4. Do not 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.
5. Do not consult notes, books, calculators.
6. Do not handle phones or cameras, or any electronic device until after you have finished your exam, handed it in to your instructor and left the room.
7. 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.
8. 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 above statements regarding academic dishonesty:

STUDENT NAME: _____

STUDENT SIGNATURE: _____

STUDENT ID NUMBER: _____ SECTION NUMBER _____

RECITATION INSTRUCTOR: _____

MA261 Spring 2015 Exam 1, 8:00-9:00pm

1. Find $\cos\theta$ where θ is the angle between $\vec{u} \times \vec{v}$ and $\vec{w}$, where $\vec{u} = \vec{i} + 2\vec{j} + \vec{k}$, $\vec{v} = -\vec{i} + \vec{j} + 2\vec{k}$, and $\vec{w} = -2\vec{i} - \vec{j} + 2\vec{k}$.

A. $4/(3\sqrt{26})$

B. $2/\sqrt{27}$

C. $4/(3\sqrt{3})$

D. $3/(\sqrt{27})$

E. $1/\sqrt{27}$

2. Find the distance between the origin and the point at which the line

$$x = 2 - 3t, \;\; y = 4 + t, \;\; z = 1 + t$$

intersects the plane x+2y-z=5.

A. $\sqrt{40}$

B. $\sqrt{43}$

C. $\sqrt{48}$

D. $\sqrt{61}$

E. $\sqrt{63}$

3. Identify the surface $x^2 - y^2 - z = 0$.

A. hyperboloid of one sheet

B. hyperboloid of two sheets

C. sphere

D. hyperbolic paraboloid

E. elliptic paraboloid

4. Determine whether the planes $3x + 2y + z = 261$ and $-x + 2y - z = 7$ are perpendicular, parallel, or neither.

A. perpendicular

B. parallel

C. neither

5. Find

$$\left| \int_0^1 \left(t\vec{i} + 3t^2\vec{j} + \frac{\pi}{2}\cos\left(\frac{\pi}{2}t\right)\vec{k} \right) \, dt \right|$$

A. $5/2$

B. $2/3$

C. $3/2$

D. $3/4$

E. $4/3$

6. Find the length of the curve

$$\vec{r}(t) = \ln(t)\vec{i} + \sqrt{2}t\vec{j} + \frac{t^2}{2}\vec{k}$$

for $1 \leq t \leq 2$.

A. $(3/4) + \ln(2)$

B. $(2/3) + 2\ln(2)$

C. $(1/4) + (1/2)\ln(2)$

D. $(3/2) + \ln(2)$

E. $(1/3) + 3\ln(2)$

7. The trajectory of a particle in space is given by $\vec{r}(t)$. Given that its acceleration is $\vec{a}(t) = 2t\vec{i} + 3t^2\vec{j} + 5t^4\vec{k}$, that the velocity at $t = 0$ is $\vec{v}(0) = 2\vec{j} + 4\vec{k}$, and that $\vec{r}(0) = \vec{i} + 2\vec{j} + 3\vec{k}$, then the $\vec{j}$ component of $\vec{r}(2)$ is:

A. 6

B. 8

C. 10

D. 12

E. 16

8. Consider the following statements:

I The limit $\lim_{(x,y)\to(0,0)}(xy)/(x^2+y^2)$ does not exist.

II The limit $\lim_{(x,y)\to(0,0)}(xy^2)/(x^2+y^2) = 0$.

III If $f(x,y)$ satisfies $\lim_{x\to 0} f(x,\lambda x) = 0$ for every $\lambda \in \mathbb{R}$, then we can conclude that $\lim_{(x,y)\to(0,0)} f(x,y) = 0$.

A. I and II are true, but III is false

B. I and III are false, but II is true

C. I is true, but II and III are false

D. I and III are true, but II is false

E. I, II, and III are false

9. Let $f(x, y) = \sqrt{xy}$. Use linear approximation to estimate the value of $f(1.06, 0.96)$.

A. 1.01

B. 1.05

C. 0.95

D. 0.99

E. 1.1

10. If $f(x, y) = \sin(x^2 y)$, $x = st$, and $y = s^2 + t$, then $\partial f / \partial s$ is:

A. $\cos(s^2t^2(s^2+t))2st^2(s^2+t) + \cos(s^2t^2(s^2+t))2s^3t^2$

B. $\cos(s^2t^2(s^2+t))t + \cos(s^2t^2(s^2+t))2s^3t^2$

C. $\cos(s^2t^2(s^2+t))2st^2(s^2+t) + \cos(s^2t^2(s^2+t))2s^2t^2$

D. $\cos(s^2+t)2st^2(s^2+t) + \cos(s^2t^2(s^2+t))2s^3t^2$

E. $\cos(s^2t^2(s^2+t))2st^2(s^2+t) + \cos(s^2t^2(s^2+t))2s$

11. Find the directional derivative of the function $F(x, y, z) = \sin(xy) + \cos(yz)$ at the point $(\pi/2, 1, \pi/2)$ in in the direction $\vec{v} = \vec{i} + \vec{j} - \vec{k}$.

A. $(2 - \pi)/(4\sqrt{3})$

B. $(2 - \pi)/(2\sqrt{3})$

C. $1 - (\pi/2)$

D. $(1 - \pi/2)/(2\sqrt{3})$

E. None of the above

12. Find the tangent plane to $f(x, y) = \ln(xy^2) + y$ at the point $(e, 1, 2)$.

A. $(x/e) + 3y - z = 4$

B. $(x/e) + 2y - 2z = 4$

C. $(x/e) + 3y - z = 2$

D. $(x/e) + y + z = 0$

E. $(x/e) + y - z = 0$