MA 16200
EXAM 1 Form 01
February 1, 2018

NAME _____ YOUR TA'S NAME _____

STUDENT ID # _____ RECITATION TIME _____

1. You must use a #2 pencil on the scantron (answer sheet).

2. Write 01 in the TEST/QUIZ NUMBER boxes and blacken in the appropriate spaces below.

3. On the scantron, fill in your TA's name and the course number.

4. Fill in your NAME and STUDENT IDENTIFICATION NUMBER and blacken in the appropriate spaces.

5. Fill in your four-digit SECTION NUMBER. If you do not know your section number, please ask your TA.

6. Sign the scantron.

7. Fill in your name and your TA's name on the question sheets above.

8. There are 12 questions, each worth 8 points (you will automatically earn 4 points for taking the exam). Blacken in your choice of the correct answer in the spaces provided for questions 1–12. Do all your work on the question sheets.

9. Turn in both the scantron and the question sheets when you are finished.

10. If you finish the exam before 7:20, you may leave the room after turning in the scantron sheet and the exam booklet. If you don't finish before 7:20, you MUST REMAIN SEATED until your TA comes and collects your scantron sheet and your exam booklet.

11. NO CALCULATORS, PHONES, BOOKS, OR PAPERS ARE ALLOWED. Use the back of the test pages for scrap paper.

EXAM POLICIES

1. Students may not open the exam until instructed to do so.
2. Students must obey the orders and requests by all proctors, TAs, and lecturers.
3. No student may leave in the first 20 min or in the last 10 min of the exam.
4. Books, notes, calculators, or any electronic devices are not allowed on the exam, and they should not even be in sight in the exam room. Students may not look at anybody else's test, and may not communicate with anybody else except, if they have a question, with their TA or lecturer.
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 these rules and any act of academic dishonesty may result in severe penalties. Additionally, all violators will be reported to the Office of the Dean of Students.

I have read and understand the exam rules stated above:

STUDENT NAME: _____

STUDENT SIGNATURE: _____

1. Find the center and the radius of the sphere described by

$$x^2 + y^2 + z^2 + 6x + 8y - 4z + 4 = 0$$

A. center $(3, 4, -2)$, radius 25

B. center $(3, 4, -2)$, radius 5

C. center $(-3, -4, 2)$, radius $\sqrt{33}$

D. center $(-3, -4, 2)$, radius 5

E. center $(3, 4, 2)$, radius 5

2. If $\vec{a} = \langle 2, 1, -3 \rangle$ and $\vec{b} = \langle 1, 2, -2, \rangle$, find $|5\vec{b} - 2\vec{a}|$

A. 6

B. 7

C. 8

D. 9

E. 10

3. Find the values of x such that $\langle 4x, x, 3\rangle$ and $\langle 2, x, 5\rangle$ are orthogonal.

A. $x = -3, -5$
B. $x = -1, -5$
C. $x = -3, 3$
D. $x = 1, -1$
E. $x = 5-, -5$

4. If $\vec{a} = 3\vec{i} - 3\vec{k}$ and $\vec{b} = \vec{i} - \vec{j}$, what is $\text{comp}_{\vec{b}}\,\vec{a}$ (the scalar projection of $\vec{a}$ onto $\vec{b}$)?

A. $\dfrac{3}{\sqrt{2}}$
B. $\dfrac{3}{\sqrt{18}}$
C. $\dfrac{3}{2}$
D. $\dfrac{1}{6}$
E. $\dfrac{1}{2}$

5. If $\vec{a} = \langle 2, 0, 1 \rangle$, $\vec{b} = \langle 3, 1, 1 \rangle$, and $\vec{c} = \vec{a} \times \vec{b} = \langle c_1, c_2, c_3 \rangle$, what is c_2?

A. -1

B. 0

C. 1

D. -2

E. 7

6. Find the area of the parallelogram with vertices $A(0, 0, 0)$, $B(1, 0, 1)$, $C(2, 1, 0)$, and $D(3, 1, 1)$

A. $\sqrt{3}$

B. 2

C. $\sqrt{6}$

D. $\sqrt{5}$

E. 6

7. Find the area of the region bounded by $y = x^2 - 4x$ and $y = -2x$

A. $\frac{2}{3}$
B. $\frac{4}{3}$
C. 1
D. $\frac{8}{3}$
E. $\frac{16}{3}$

8. Find the area of the region bounded by $y = x$ and $x = y^2 - 2y$

A. 3
B. 9
C. $\frac{3}{2}$
D. $\frac{9}{2}$
E. $\frac{27}{2}$

9. The area between the graphs of $y = x^2$ and $y = 2x$ is revolved around the x-axis. If the disk/washer method is used, the integral representing the volume of the resulting solid is

A. $\displaystyle\int_0^2 \pi(2x - x^2)\ dx$

B. $\displaystyle\int_0^2 \pi(2x - x^2)^2\ dx$

C. $\displaystyle\int_0^4 2\pi x(2x - x^2)\ dx$

D. $\displaystyle\int_0^4 2\pi x(4x^2 - x^4)\ dx$

E. $\displaystyle\int_0^2 \pi(4x^2 - x^4)\ dx$

10. The area between the graphs of $y = x^2$ and $y = 2x$ is revolved around the x-axis. If the method of cylindrical shells is used, the integral representing the volume of the resulting solid is

A. $\displaystyle\int_0^2 2\pi y(y^2 - 2y)\ dy$

B. $\displaystyle\int_0^4 2\pi y(\sqrt{y} - \frac{y}{2})\ dy$

C. $\displaystyle\int_0^2 \pi(y^2 - 2y)\ dy$

D. $\displaystyle\int_0^4 2\pi y(y - \frac{y^2}{4})\ dy$

E. $\displaystyle\int_0^4 \pi(y^4 - 4y^2)\ dy$

11. What value of the positive constant c makes the volume of the solid obtained by rotating the area between $x = 0$, $y = e^{2x}$, and $x = c$ about the x-axis equal to π?

A. $\frac{1}{4} \ln 2$

B. $\frac{1}{2} \ln \pi$

C. $\frac{1}{5} \ln 4$

D. $\frac{1}{4} \ln \pi$

E. $\frac{1}{4} \ln 5$

12. An unusual pyramid of height 2 is sitting on the xy-plane. If the cross-section at a level $z \geq 0$ is a square of side $\sqrt{2 - z}$, what is the volume of this strange pyramid?

A. 2

B. $\dfrac{8}{3}$

C. $\dfrac{2^{5/2}}{3}$

D. 4

E. 3π