MA 16200
EXAM 1 INSTRUCTIONS
VERSION 01
February 8, 2022

Your name _____ Your TA's name _____

Student ID # _____ Section # and recitation time _____

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

2. Check that the cover of your exam booklet is GREEN and that it has VERSION 01 on the top. Write 01 in the TEST/QUIZ NUMBER boxes and blacken in the appropriate spaces below.

3. On the scantron sheet, fill in your **TA's name (NOT the lecturer's name)** and the course number.

4. Fill in your NAME and PURDUE ID NUMBER, and blacken in the appropriate spaces.

5. Fill in the four-digit **SECTION NUMBER**.

6. Sign the scantron sheet.

7. Blacken your choice of the correct answer in the space provided for each of the questions 1–12. While mark all your work on the scantron sheet, you should show your work on the exam booklet. Although no partial credit will be given, any disputes about the grade or grading will be settled by examining your written work on the exam booklet.

8. There are 12 questions, each worth 8 points (you will automatically earn 4 point for taking the exam).The maximum possible score is 100 points.

9. NO calculators, electronic device, books, or papers are allowed. Use the back of the test pages for scrap paper.

10. After you finish the exam, turn in BOTH the scantron sheet and the exam booklet.

11. If you finish the exam before 7:25, you may leave the room after turning in the scantron sheets and the exam booklets. If you don't finish before 7:25, you should REMAIN SEATED until your TA comes and collects your scantron sheet and exam booklet.

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 5 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 scantron sheet and the exam booklet.
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: _____

1. The point (1, -2, 3) lies on a sphere centered at (-4, 5, -2). What is the radius of the sphere?

A. $5\sqrt{3}$

B. $3\sqrt{11}$

C. $\sqrt{35}$

D. $\sqrt{19}$

E. 99

2. Vectors $\vec{v} = \langle 1, 2 \rangle$ and $\vec{w} = \langle 2, 3 \rangle$ are given. Find the vector projection of $\vec{w}$ onto $\vec{v}$.

A. $\langle 8/\sqrt{5}, 16/\sqrt{5} \rangle$

B. $\langle 16/13, 24/13 \rangle$

C. $\langle 8/5, 16/5 \rangle$

D. $\langle 16/\sqrt{13}, 24/\sqrt{13} \rangle$

E. $\langle 12/11, 24/11 \rangle$

3. Find the area of the region bounded by $y = .5x + 3$ and $y = x^2 - 1.5x + 3$.

A. $4/3$

B. $-2/3$

C. $1/3$

D. $2/3$

E. 0

4. The region bounded by $y = e^{-x}$, $y = 1$, and $x = -2$ is revolved about the x-axis. If the washer method is used, the volume of the solid generated is given by the integral

A. $2\pi \int_{-2}^{0} \pi(\ln(-x) - x)dx$

B. $\int_{-2}^{0} \pi(e^{-x} - 1)^2 dx$

C. $\int_{0}^{2} 2\pi x(e^{-x} - 1)dx$

D. $\int_{-2}^{0} \pi(e^{-2x} - 1)dx$

E. $\int_{-2}^{0} \pi e^{-2x} dx$

5. The angle between $\vec{a} = \langle -1, 2, 2 \rangle$ and $\vec{b} = \langle -1, 1, 0 \rangle$ is

A. 0

B. $-\pi/4$

C. $\pi/4$

D. $\pi/3$

E. $-\pi/3$

6. Find the volume of the parallelepiped with adjacent edges PQ, PR and PS where $P(2,1,3)$, $Q(1,3,4)$, $R(2,1,-1)$ and $S(2,2,5)$ are points in $\mathbb{R}^3$.

A. 4

B. 16

C. $2\sqrt{2}$

D. 8

E. Does not exist.

7. The volume of the solid obtained by rotating the region bounded by the curves $y = x$ and $y = x^2$ about the y-axis is

A. π

B. $\pi/2$

C. $1/6$

D. 1

E. $\pi/6$

8. Find the volume of the solid whose base is the region bounded by $y = \sqrt{\cos x}$ and the x-axis on $[-\pi/2, \pi/2]$, and whose cross sections through the solid perpendicular to the x-axis are squares with a horizontal side in the xy-plane and a vertical side above the x-axis.

A. 1

B. 2

C. 2π

D. π

E. $2\sqrt{2}$

9. The region enclosed by the curve $y = \sin x$, $(0 \leq x \leq \pi)$ and the x-axis is rotated about the line $y = -1$. The volume of the generated solid is

A. $\pi \int_0^{\pi} ((\sin x + 1)^2 - 1) dx$

B. $\pi \int_0^{\pi} (\sin^2 x + 1) dx$

C. $2\pi \int_0^{\pi} x(\sin x + 1) dx$

D. $2\pi \int_0^{\pi} x(\sin x + 1)^2 dx$

E. $\pi \int_0^{\pi} (\sin^2 x - 1)^2 dx$

10. A surface is obtained by rotating $y = x^3$, $(0 \leq x \leq 1)$, about the x-axis. Find the surface area.

A. $(10^{3/2} - 1)$

B. $2\pi/36$

C. $2\pi 10^{3/2}$

D. $\pi/27(10^{3/2} - 1)$

E. $\pi/27$

11. Use the method of cylindrical shells to find the volume generated by rotating the region bounded by the curves $y = x - x^2$ and $y = 0$, about the line $x = -1$.

A. 2π

B. $\frac{\pi}{4}$

C. π

D. $\frac{\pi}{3}$

E. $\frac{\pi}{2}$

12. A force of 50 N is required to hold a spring that has been stretched from its natural length of 1 m to a length of 1.5 m. How much work is done (in joules) by stretching the spring from a length of 2 m to a length of 3 m?

A. 100 J

B. 250 J

C. 150 J

D. 300 J

E. Not enough information.