MATH 251 – MIDTERM 3

Name	
Student ID	
Section	501
Signature	

Instructions: Welcome to your Midterm! You have 50 minutes to take this exam, for a total of 50 points. No books, notes, calculators, or cellphones are allowed. Remember that you are not only graded on your final answer, but also on your work. **Please put your answers in the boxes provided.** If you need to continue your work on a scratch paper, please check the box "Work on Scratch Paper," or else your work will be discarded.

Academic Honesty Statement: With the signature above, I certify that the exam was taken by the person named and without any form of assistance and acknowledge that any form of cheating (no matter how small) results in an automatic F in the course, and will be further subject to disciplinary consequences, pursuant to the Aggie Honor Code.

Date: Friday, November 12, 2021.

1. *(10 points)* Evaluate the following *impossible* integral by changing the order of integration. Simplify your answer.

$$\int_0^4 \int_{\sqrt{x}}^2 10x \cos\left(y^5\right)\, dydx$$

Answer	

☐ Work on Scratch Paper

2. *(10 points)* Evaluate the following integral, where D is the region in the first quadrant bounded by the disk $x^2 + y^2 = 4$, the line $y = x$, and the $y-$axis

$$\iint_D 2y^2\, dxdy$$

Answer	

☐ Work on Scratch Paper

3. *(10 points)* Set up, but do **NOT** evaluate, a triple integral that calculates the mass of an object E with density $2y$.

   Here E is the region in the first octant bounded by the surface $y = \sqrt{x}$ and the planes $y + z = 3$ and $y = 3$. Write your integral in the usual order, with $dzdydx$.

Answer	

☐ Work on Scratch Paper

4. *(10 points)* Evaluate the following integral, where E is the region inside the sphere $x^2 + y^2 + z^2 = 4$ and below the cone $z = \sqrt{x^2 + y^2}$, in the first octant

$$\iiint_E 4z \, dxdydz$$

Answer	

☐ Work on Scratch Paper

5. *(10 points)* Use a change of variables to evaluate the following double integral, where D is the diamond with vertices $(0,0)$, $(3,2)$, $(3,-2)$, $(6,0)$

$$\iint\limits_D (2x+3y)^3(2x-3y)^2 \, dxdy$$

Simplify as much as possible, but leave your answer as a power.

Answer	

☐ Work on Scratch Paper