Math 32B - Fall 2019
Practice Exam 1

Full Name: ________________________________

UID: ________________________________

Circle the name of your TA and the day of your discussion:

Steven Gagniere    Jason Snyder    Ryan Wilkinson

Tuesday    Thursday

Instructions:

• Read each problem carefully.

• Show all work clearly and circle or box your final answer where appropriate.

• Justify your answers. A correct final answer without valid reasoning will not receive credit.

• Simplify your answers as much as possible.

• Include units with your answer where applicable.

• Calculators are not allowed but you may have a 3 × 5 inch notecard.

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Total: 100
1. (10 points) Evaluate the iterated integral.

\[ \int_{0}^{4} \int_{\sqrt{y}}^{2} \sqrt{x^3 + 1} \, dx \, dy \]

2. (10 points) Evaluate the iterated integral.

\[ \int_{0}^{3} \int_{0}^{\sqrt{9-x^2}} e^{x^2+y^2} \, dy \, dx \]
3. (10 points) Find the volume of the solid enclosed by $z = 0$, $y = z$, and $x^2 + y^2 = 4$.

4. (10 points) Use a triple integral to find the volume of the solid enclosed by $y = x^2$, $z = 3y$, and $z = 2 + y$. 
5. (15 points) Consider the tetrahedron bounded by the coordinate planes and the plane $x + y + z = 1$ with density function $\delta(x, y, z) = 12y$.

1. Find the mass of the tetrahedron.

2. Set up but **DO NOT EVALUATE** the integrals used to find the center of mass of the tetrahedron.
6. (20 points) Evaluate the triple integral \[ \iiint_E x^2 \, dV \] where \( E \) is the solid above \( z = 0 \) and inside \( 4x^2 + 9y^2 + z^2 = 36 \).
7. (10 points) Find the area inside one petal of the polar rose \( r = \sin(2\theta) \).

8. (15 points) Use a change of variables to evaluate \( \iint_{D} x \, dA \) where \( D \) is the region in the first quadrant bounded by \( y = 0 \), \( y = 4 \), \( y = x^2 \), and \( y = x^2 - 4 \).