Math 32B - Fall 2019
Exam 1 - V1

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.

Page	Points	Score
1	25	
2	25	
3	25	
4	25	
Total:	100	

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You may use this page for scratch work. Work found on this page will not be graded unless clearly indicated in the exam.

1. (15 points) Evaluate the iterated integral

$$\int_0^2 \int_{y/2}^1 \cos\left(\frac{\pi}{6}x^2\right)\, dx\, dy.$$

2. (10 points) Evaluate the iterated integral.

$$\int_{-4}^4 \int_0^{\sqrt{16-x^2}} \frac{1}{\sqrt{1+x^2+y^2}}\, dy\, dx$$

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3. (10 points) Find a constant C such that

$$p(x,y) = \begin{cases} Cx^2y & \text{if } 0 \le y \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$$

is a joint probability density function.

4. (15 points) Use a triple integral to find the volume of the solid enclosed by $x = y^2 + z^2$ and $x = 8 - y^2 - z^2$.

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5. (25 points) Let $\mathcal{W}$ be the solid inside the sphere $x^2 + y^2 + z^2 = 4$ for $z \geq 1$. Set up but **DO NOT EVALUATE** a triple integral in each of the following coordinate systems that computes the mass of the solid $\mathcal{W}$, assuming it has density function $\delta(x, y, z) = 7xy$.

   1. Rectangular coordinates

   2. Cylindrical coordinates

   3. Spherical coordinates

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6. (10 points) Use a double integral to find the area inside one loop of the polar rose $r = 3\sin(4\theta)$. *Hint:* You may use the double angle formula $\sin^2(x) = \dfrac{1-\cos(2x)}{2}$.

7. (15 points) Use a change of variables to evaluate $\displaystyle\iint_{\mathcal{R}} \cos\left(4x^2+9y^2\right)\,dA$ where $\mathcal{R}$ is the region in the first quadrant of the xy-plane bounded by the ellipse $4x^2+9y^2=1$.

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