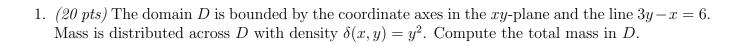
EXAM 2

Math 212, 2019 Fall, Clark Bray.

Name:	Section:	Student ID:
GENERAL RULES		
YOU MUST SHOW ALL WORK AND EXPLAIN AS CLARITY WILL BE CONSIDERED IN GRADING.	LL REASONINC	G TO RECEIVE CREDIT.
No notes, no books, no calculators.		
All answers must be reasonably simplified.		
All of the policies and guidelines on the class webpage	es are in effect on	this exam.
WRITING I	RULES	
Do not write anything near the staple – this will be cu	ut off.	
Use black pen only. You may use a pencil for initial sk drawn over in black pen and you must wipe all erasure	0	
Work for a given question can be done ONLY on the form on. Room for scratch work is available on the back of the end of this packet; scratch work will NOT be grad	this cover page,	
DUKE COMMUNITY STAI	NDARD STAT	EMENT
"I have adhered to the Duke Community Star	ndard in complet	ing this examination."
Signature:		



2. (20 pts) The solid R is bounded by the surfaces y = 0, y = z, y + z = 4, x + 2y + 3z = 20, and $x = -4z^2$. Mass is distributed across R with density $\delta(x, y) = 3$.

Write as an iterated triple integral (but do not evaluate it) the moment of inertia of R around the line defined by x = -1 and z = -2.

3. (20 pts) The solid polygon S in the xy-plane has vertices at (1,2), (-2,1), (-1,-2), (2,-1). Compute the integral over S of the function f(x,y)=3x+y-2.

4. (20 pts) The surface S has equation $z - z^2 = \sqrt{x^2 + y^2}$. Mass is enclosed inside of S with density given by $\delta(x, y, z) = \sqrt{x^2 + y^2}$. Set up an iterated integral (but do not evaluate) representing the total mass enclosed inside of S.

5. (20 pts) For this question we assume that the surface of the earth is a perfect sphere of radius R. There is a latitude line α with the feature that the area between the equator and α is the same as the area north of α . Find α .

If it comes up in your calculations, you may use that

$$\left\| \begin{pmatrix} -\sin b \sin a \\ \sin b \cos a \\ 0 \end{pmatrix} \times \begin{pmatrix} \cos b \cos a \\ \cos b \sin a \\ -\sin b \end{pmatrix} \right\| = |\sin b|$$