Math 2173 Spring 2021 Recitation Handout 5

Group Member 1: _____

Group Member 2: _____

Group Member 3: _____

Group Member 4: _____

Group Member 5: _____

Group Member 6: _____

Below is a checklist of instructions to follow when completing this assignment. Failure to follow these directions will result in penalty on your final score and/or in some problems not being graded. If multiple directions are not followed, then it is also possible that the assignment will not be accepted for any credit at all. Please contact your TA or make a post on the discussion boards for this course if you have any questions about this assignment or these directions.

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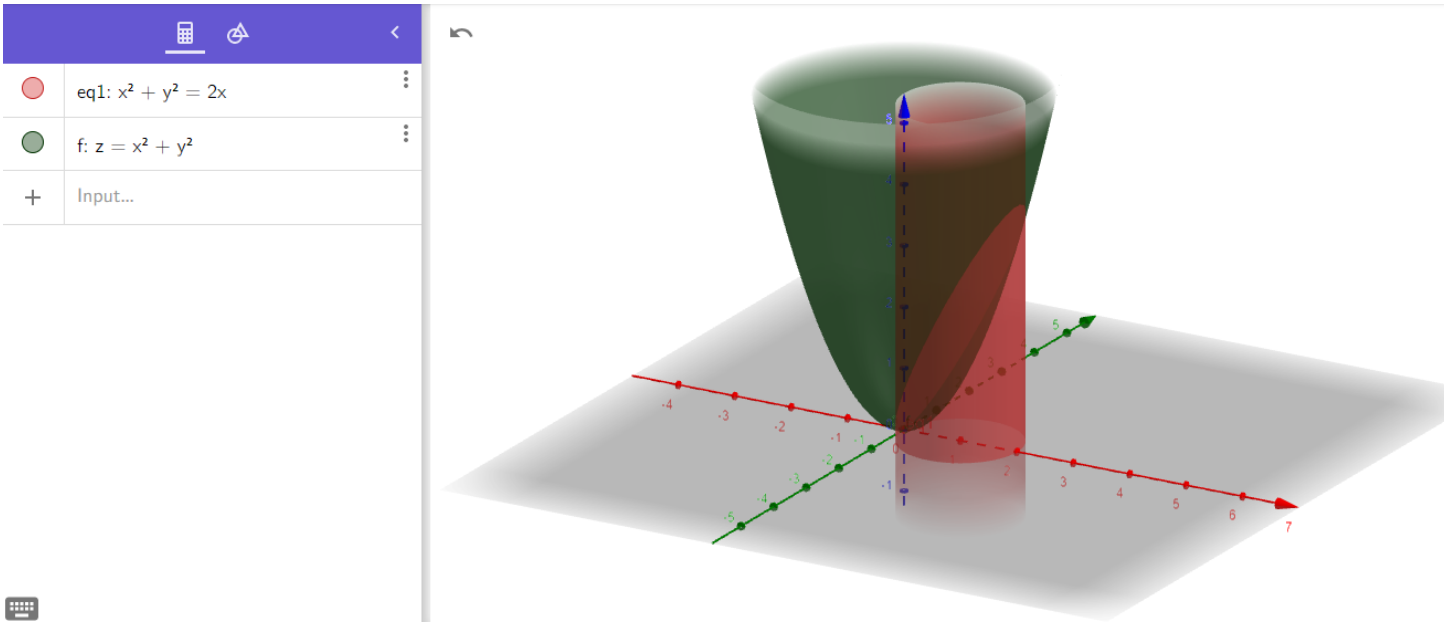
Checklist of Instructions	
	Please clearly write the names of all group members working on this assignment in the spaces allotted above.
	This assignment must be completed by a group of 3, 4, 5, or 6 members.
	This assignment is to be uploaded to gradescope as a pdf file no later than 11:59 PM EST on Sunday, February 14.
	The assignment will be uploaded by 1 group member, and that group member will be responsible for manually entering the names of all other collaborators into gradescope.
	This assignment must be completed using this template. You may either print this template to write on it and then scan it (pages ordered correctly) into a pdf file, or you may write directly on the template using programs such as notability.
	If you need more space than what is given to solve a given problem, then you will find blank pages provided at the end of this template. At the end of each problem section of this assignment you will find a space in which to indicate on what page your work is continued in case you used additional pages to complete your solution. You must provide the page number on which your work is continued in the alloted space, or write 'N/A' incase you did not use any additional pages.
	On the additional pages, you will also find space in which to indicate which problem the page is being used for, and if the page is used then that space must also be filled.
	To complete this handout, you may use your textbook, class notes, discussions with your TA and group members, and any resources that are available on Carmen. You should not receive any help from the MSLC or people outside of your group when solving these problems. You may discuss these problems on the Carmen discussion boards, but you should not provide your entire solution when answering a such question, you should only give a hint or a helpful idea.

(Ungraded Optional) Problem: Find the volume of the solid that lies under the paraboloid $z = x^2 + y^2$, above the xy-plane, and inside the cylinder $x^2 + y^2 = 2x$.



(Ungraded Optional Problem) Problem 14.3.44: Let R be the region inside both the cardiod $r = 1 + \sin(\theta)$ and the cardiod $r = 1 + \cos(\theta)$. Sketch a picture of the region R, or create an image of the region R using a graphing program, then use double integration to find the area of R.

Our personal notes for (Ungraded Optional) Problem 14.3.44 is continued on page Page 4

Problem 14.2.66 (10 points): Evaluate

(1) $$\int_0^4 \int_{\sqrt{x}}^2 \frac{x}{y^5+1} dydx$$

by changing the order of integration.

Hint: Start by drawing a picture of the region of integration.

Problem 14.2.92 (8+4 points): Let R be the region inside of the ellipse $\frac{x^2}{18} + \frac{y^2}{36} = 1$ for which we also have $y \leq \frac{4}{3}x$.

(a) Find the area of R by evaluating

$$\iint_R 1 dy dx. \tag{2}$$

(b) Evaluate

$$\iint_R xy dy dx. \tag{3}$$

You will recieve 8/8 points for this problem if you just set up but do not evaluate the integrals for parts (a) and (b). You will receive 4 bonus points for the evaluation of the integrals in parts (a) and (b) for the opportunity to earn 12/8 points on this problem.

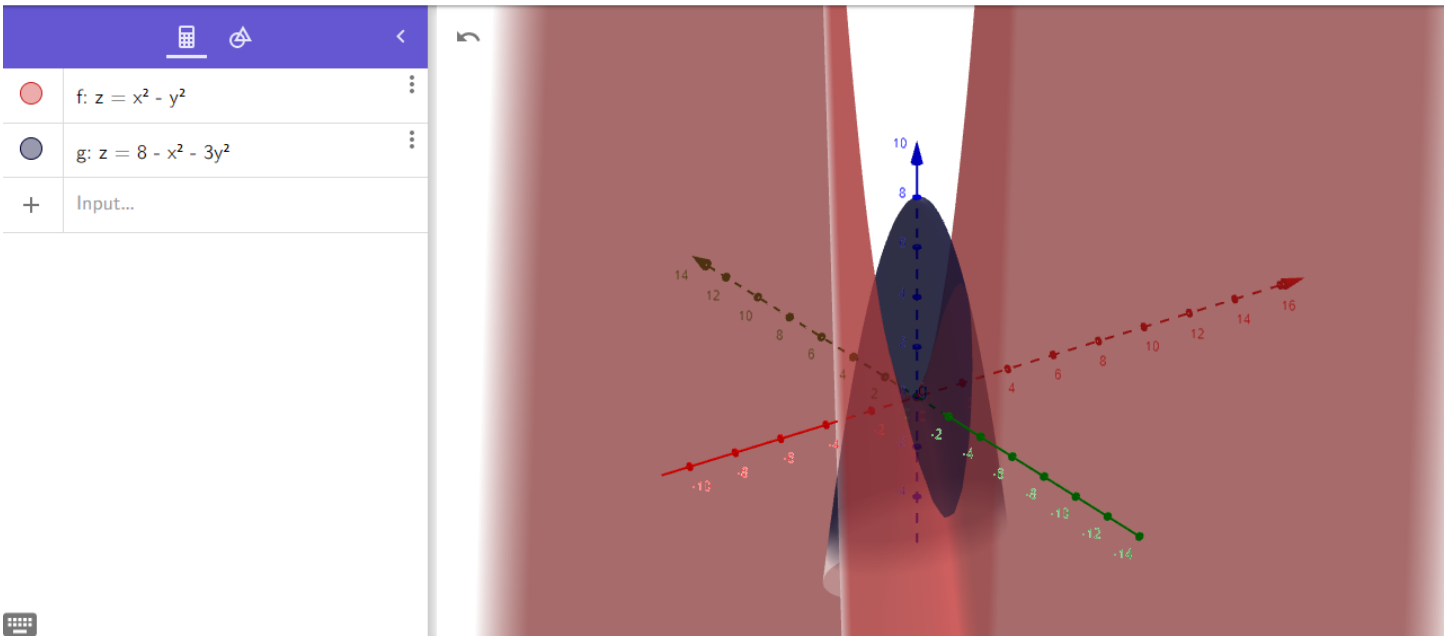
Hint: Draw a picture of the region R on a graphing program. To help you solve this problem, you may also use the fact that

$$\int \sqrt{1-x^2} = \frac{1}{2}x\sqrt{1-x^2} + \frac{1}{2}\sin^{-1}(x) + C \tag{4}$$

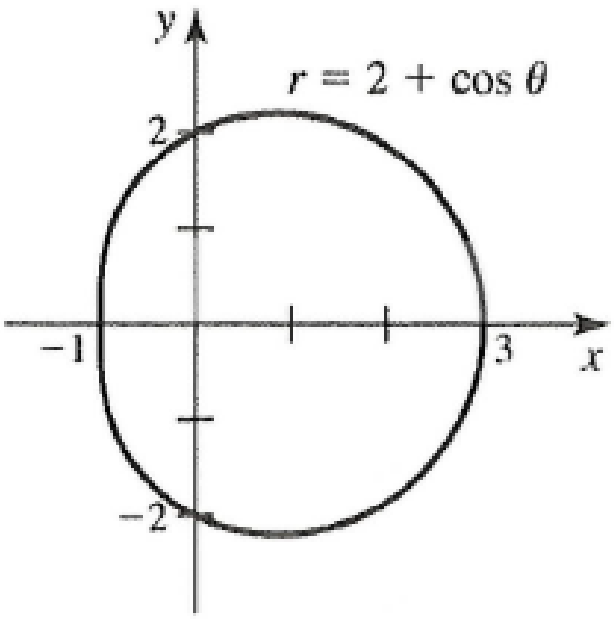
It is also possible to solve either part of this problem using symmetry. If you figure out how to do this, it will greatly reduce the amount of calculations that you have to do.

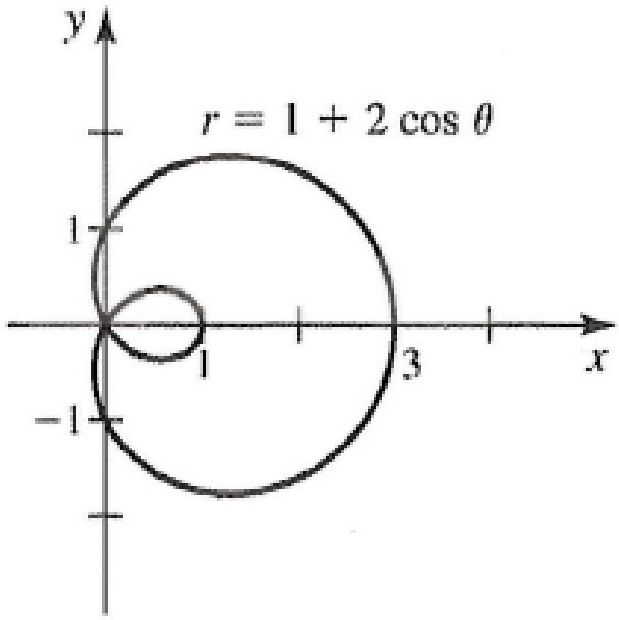
Our work for the problem 14.2.92 is continued on page

Problem 14.3.22 (8 points): Find the volume of the solid bounded by the paraboloid $z = 8 - x^2 - 3y^2$ and the hyperbolic paraboloid $z = x^2 - y^2$.



Problem 14.3.67 (10 points): The limaçon $r = b + a\cos(\theta)$ has an inner loop if $b < a$ and no inner loop if $b > a$.





(a) Find the area of the region bounded by the limaçon $r = 2 + \cos(\theta)$.
(b) Find the area of the region outside the inner loop and inside the outer loop of the limaçon $r = 1 + 2\cos(\theta)$.
(c) Find the area of the region inside the inner loop of the limaçon $r = 1 + 2\cos(\theta)$.

Note: Be careful not to double count any portion of area when solving parts (b) and (c) of this problem.

Our work for the problem 14.3.67 is continued on page

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