MATH 2414 EXAM II
SPRING 2019 EGLEY

PRINT YOUR NAME ON THE EXAM BOOK. YOU NEED ONLY YOUR NAME, NOT THE OTHER INFO

*** * * PHONES OFF!! * * ***

IMPORTANT: IF YOU DO NOT SHOW YOUR WORK IN A NEAT AND ORDERLY FASHION, YOU FORFEIT YOUR CLAIM TO ANY CREDIT.

PLEASE PLACE A BOX AROUND YOUR FINAL RESULTS.

PENALTY FOR NOT FOLLOWING DIRECTIONS: -2 pts

WORK EXACTLY ONE PROBLEM ON EACH PAGE IN THE EXAM BOOK.

I. THE FINAL EXAM FOR THIS COURSE IS

AM CLASS: 9:00 – 10:50 WEDNESDAY, MAY 8

PM CLASS: 12:30 – 2:20 THURSDAY, MAY 9.

WRITE THAT ON THE FRONT OF YOUR EXAM BOOK.

I. THIS IS THE ONLY SECTION WHERE YOU **WILL BE REQUIRED TO COMPUTE THE INTEGRALS**.
FOR SPRING #1, ASSUME THAT 16 JOULES OF WORK IS REQUIRED TO STRETCH THE SPRING FROM 0 METERS TO 4 METERS.
FOR SPRING #2, ASSUME THAT A FORCE OF 36 NEWTONS WILL COMPRESS THE SPRING 6 METERS.
WHICH OF THE FOLLOWING REQUIRES MORE WORK?
(A) STRETCHING SPRING #1 FROM 2 METERS TO 5 METERS
(B) STRETCHING SPRING #2 FROM 1 METER TO 3 METERS

FROM THIS POINT FORWARD, YOU NEED NOT EVALUATE THE INTEGRALS, SIMPLY SET THEM UP.

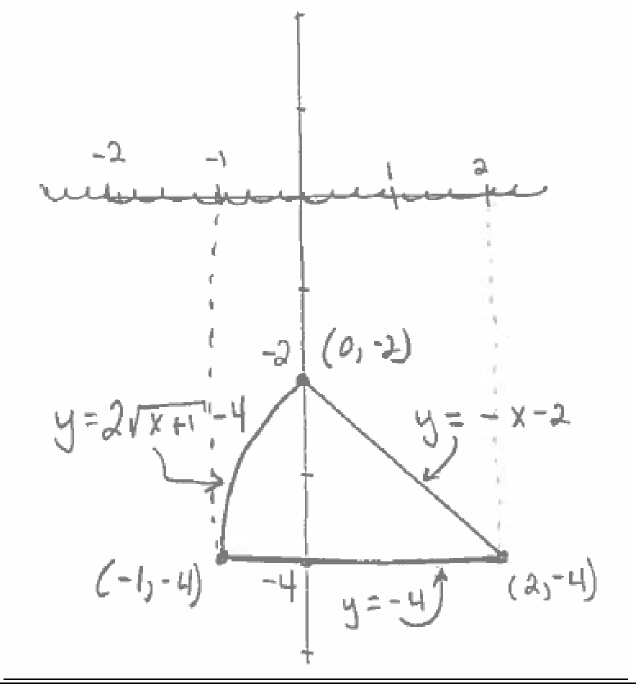
II. AS INDICATED IN THE PICTURE, A PLATE IS BOUNDED BY THE EQUATIONS

$y = 2\sqrt{x+1} - 4$

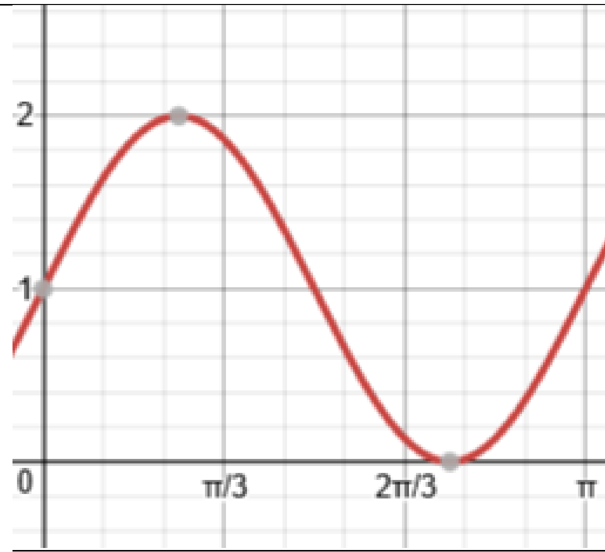
$y = -x - 2$

$y = -4$

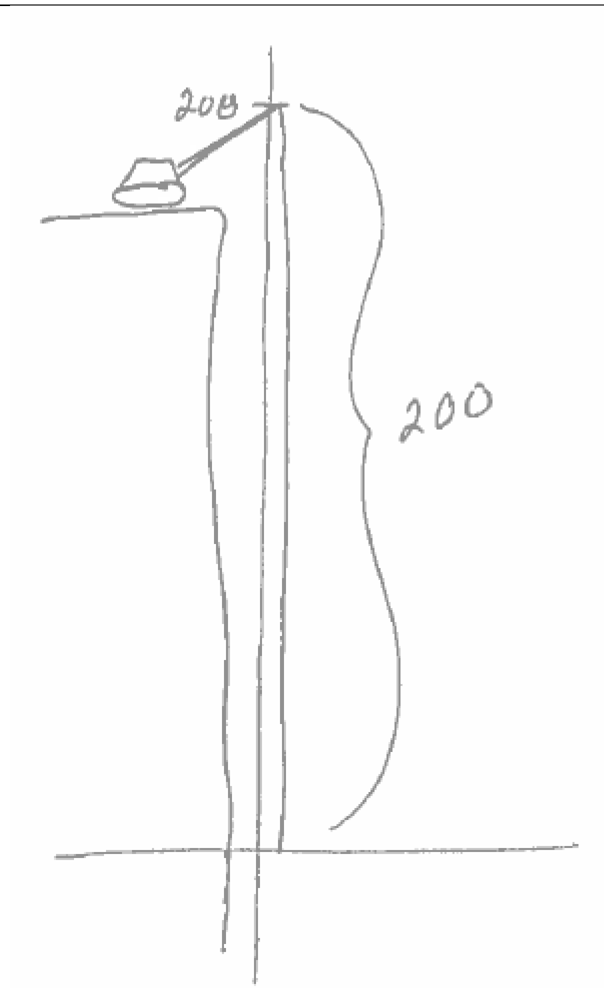
AND IS SUBMERGED IN A FLUID WITH DENSITY CONSTANT OF ρ.
SET UP AN INTEGRAL WHICH WILL DETERMINE THE TOTAL FLUID FORCE AGAINST ONE SIDE OF THE PLATE.



III. SET UP AN INTEGRAL WHICH WILL FIND THE ARC LENGTH OF THE FUNCTION $y = 1 + \sin(2x)$ ON THE INTERVAL $[0, \pi]$.



IIII. A CRAIN WITH A WINCH HAS 200 FT OF CABLE HANGING FROM IT. ASSUME THE CABLE WEIGHS
6 POUNDS PER FOOT. SET UP AN INTEGRAL WHICH WILL FIND THE AMOUNT OF WORK DONE LIFTING AND WINDING ALL 200 FT OF THE CABLE AROUND THE WINCH.



V. SEE THE FIGURES. A REGION IS BOUNDED BY THE GRAPHS OF THE EQUATIONS

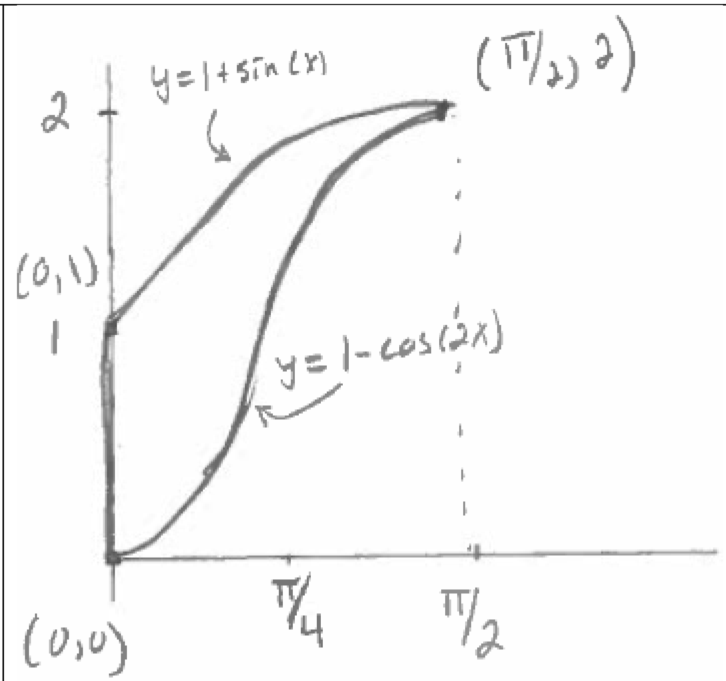
$$y = 1 + \sin(x)$$
$$y = 1 - \cos(2x)$$
$$x = 0$$

SET UP AN INTEGRAL WHICH WILL COMPUTE THE VOLUME OF THE SOLID OF REVOLUTION FORMED BY REVOLVING THE REGION

(A) ABOUT THE LINE $x = \frac{\pi}{2}$. NOTE THAT THE FIGURE IS HOLLOW.

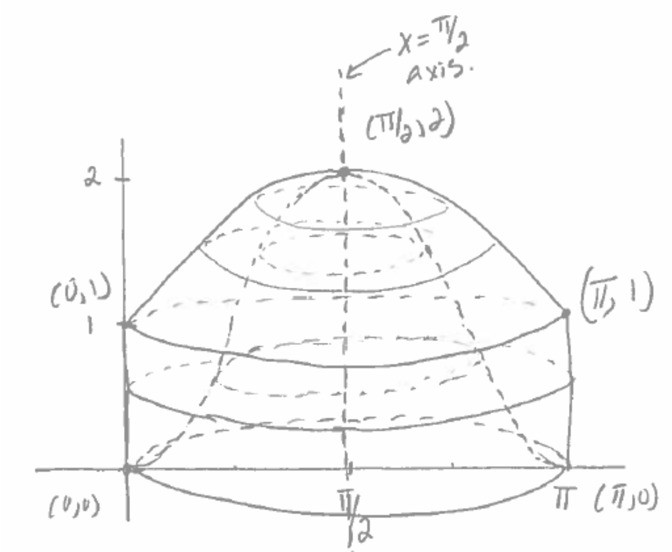
(B) ABOUT THE LINE $y = -1$ NOTE THAT THE FIGURE IS HOLLOW

YOU MAY ELECT TO USE EITHER THE DISK/WASHER METHOD OR THE SHELL METHOD, HOWEVER, **YOU NEED TO CLEARLY STATE** WHICH METHOD YOU ARE USING.



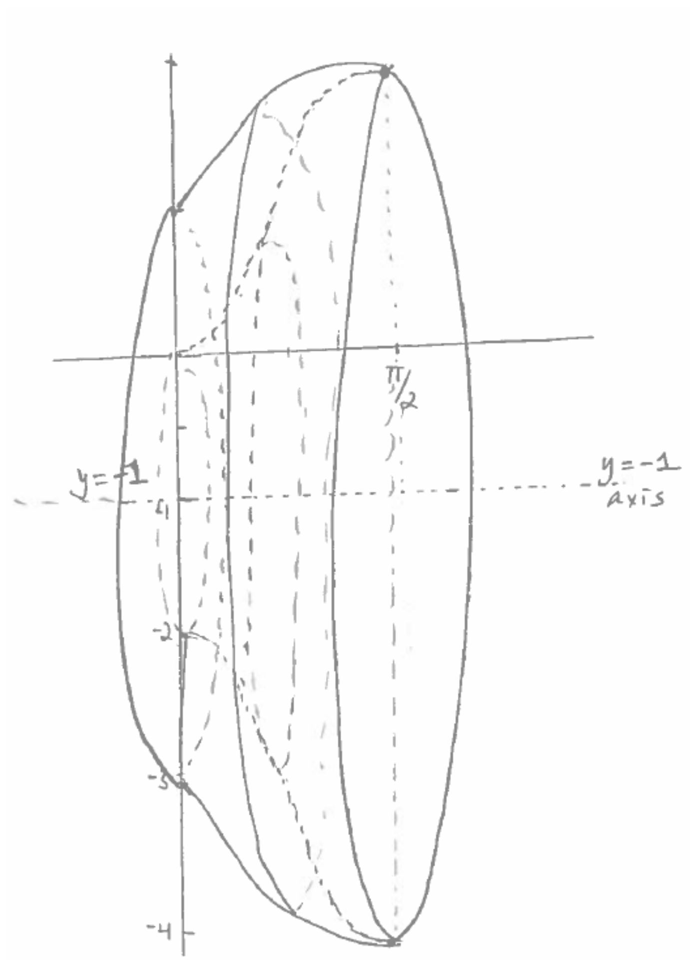
(A) REVOLVE ABOUT THE LINE $x = \frac{\pi}{2}$.

NOTE THAT THE FIGURE IS HOLLOW.



(B) REVOLVE ABOUT THE LINE $y = -1$.

NOTE THAT THE FIGURE IS HOLLOW



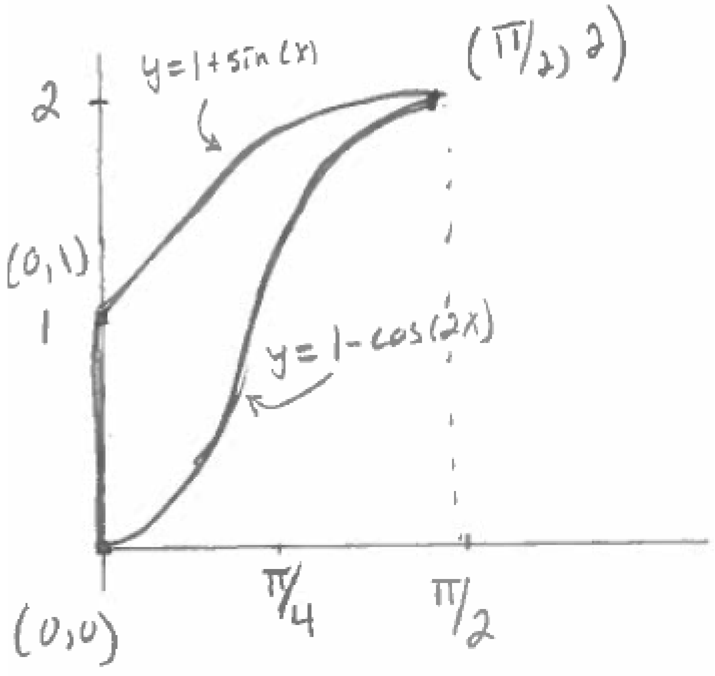
VI. FOR THE REGION GIVEN IN ITEM V ABOVE:

$y = 1 + \sin(x)$

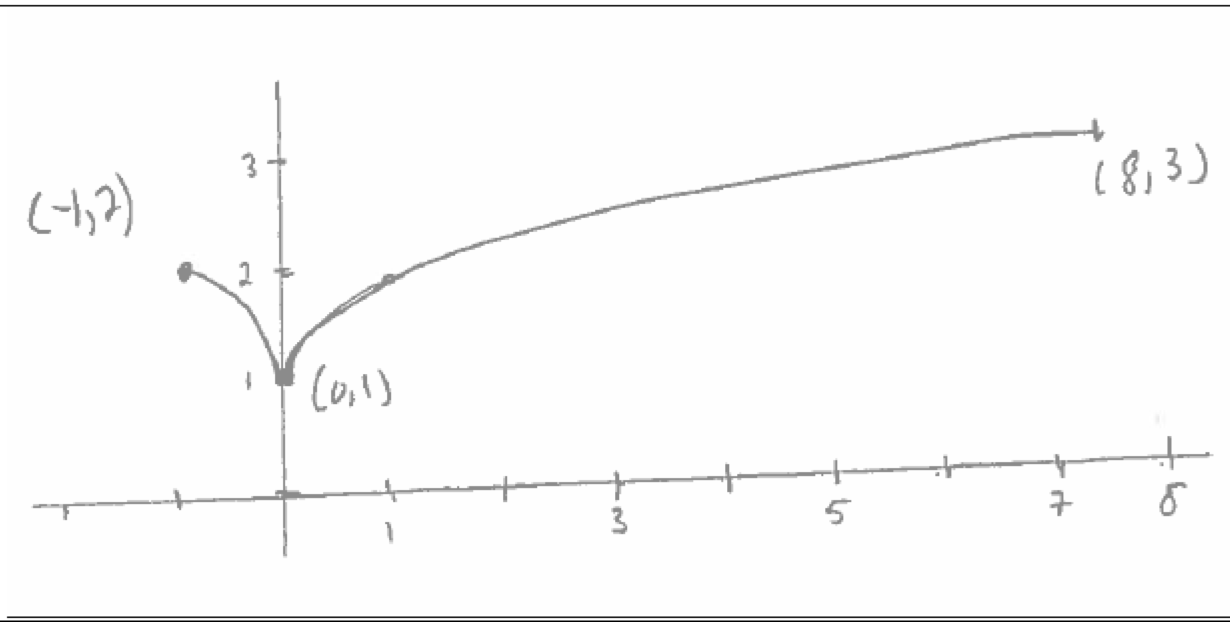
$y = 1 - \cos(2x)$

$x = 0$

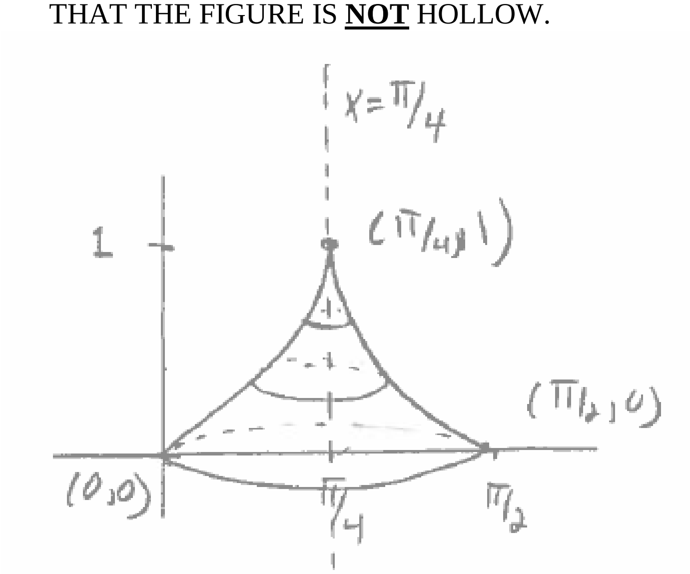
SET UP ALL THE INTEGRALS REQUIRED TO COMPUTE THE CENTER OF MASS. THAT IS, SET UP INTEGRALS REQUIRED TO FIND THE MOMENTS, M_x AND M_y, AND THE TOTAL MASS, m.

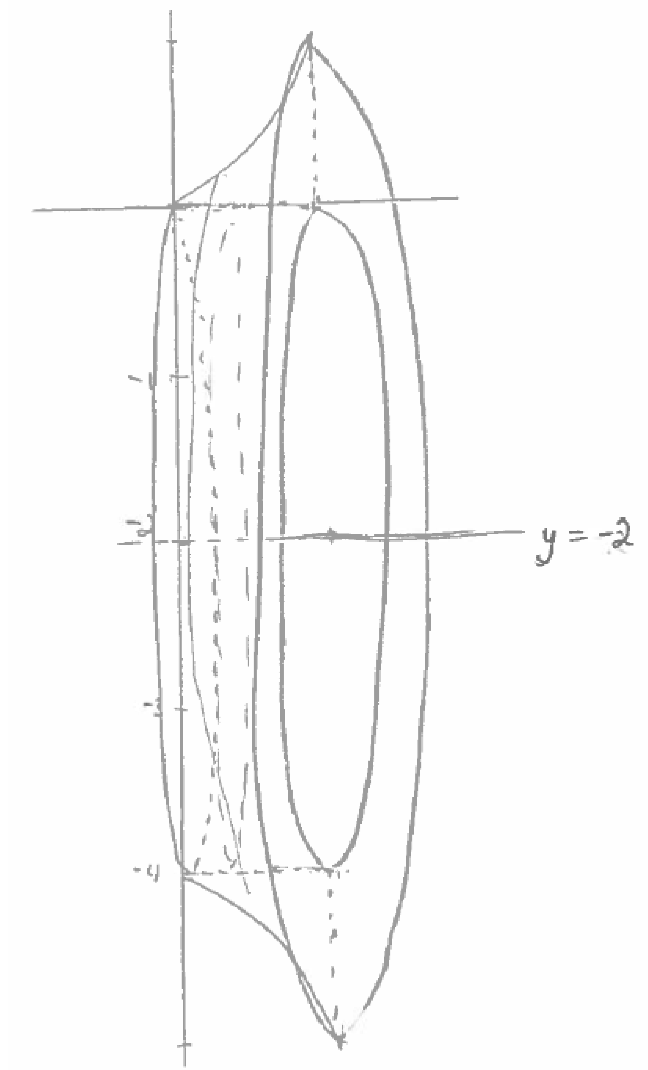


VII. SET UP THE INTEGRALS REQUIRED TO FIND THE ARC LENGTH OF THE GRAPH OF $y = 1 + x^{(2/3)}$ ON THE INTERVAL $[-1,8]$. NOTE THAT THERE IS A CUSP IN THE GRAPH AT THE POINT $(0, 1)$.



VIII. SEE THE FIGURES. A REGION IS BOUNDED BY THE GRAPHS OF THE EQUATIONS $y = \tan(x)$ $x = \pi/4$ $y = 0$ SET UP AN INTEGRAL WHICH WILL COMPUTE THE VOLUME OF THE SOLID OF REVOLUTION FORMED BY REVOLVING THE REGION (A) ABOUT THE LINE $x = \pi/4$ (B) ABOUT THE LINE $y = -2$ YOU MAY ELECT TO USE EITHER THE DISK/WASHER METHOD OR THE SHELL METHOD, HOWEVER, **YOU NEED TO CLEARLY STATE** WHICH METHOD YOU ARE USING.	(B) REVOLVE ABOUT THE LINE $y = -2$. NOTE THAT THE FIGURE **IS** HOLLOW.
(A) REVOLVE ABOUT THE LINE $x = \pi/4$ NOTE THAT THE FIGURE IS **NOT** HOLLOW.	





IX. A TANK OF LIQUID WITH DENSITY CONSTANT OF ρ IS SHAPED AS PICTURED. WHEN VIEWED AS A CROSS SECTION, AS PICTURED, THE SIDES OF THE TANK ARE QUARTER-CIRCLE ARCS WITH RADIUS OF 2 METERS, AND THE EQUATION IS AS INDICATED. ASSUME THE DEPTH OF THE LIQUID IS 1 METER.
SET UP AN INTEGRAL WHICH WILL COMPUTE THE WORK DONE ELEVATING AND EMPTYING THE LIQUID OVER THE TOP EDGE OF THE TANK.