

Name: _____

Score: _____ / 50

Student ID: _____

DO NOT OPEN THE EXAM UNTIL YOU ARE TOLD TO DO SO

	1	2	3	4	5	6	7	8	9	Total
✓										50
Score										
Pts. Possible	X	X	X	X	X	X	X	X	X	54

INSTRUCTIONS FOR STUDENTS

- Questions are on both sides of the paper. This is an 9 question exam.
- Students have 2 hours and 15 minutes to complete the exam.
- The test will be out of **50 points**. The highest possible score will be **54 points**. You can attempt as many of the questions as you wish, but keep in mind you are trying to get to the **50 points**.
- In the above table, the row with the ✓, is for you to keep track of the problems you are attempting/completing.
- Higher point problems are harder, thus they are weighted more. In order to do well, you will have to attempt some of the more difficult problems.
- You may complete parts of problems, as partial credit will be given based on correctness, completeness, and ideas that are leading to the correct solutions.
- **PLEASE SHOW ALL WORK**. Any unjustified claims will receive no credit. Clearly box your final answer.
- No notes, textbooks, phones, calculators, etc. are allowed for the exam.
- The back of the test can be used for scratch work.

GOOD LUCK!

FORMULAS:

Useful Formulas	Useful Formulas
$\frac{d(\arcsin(x))}{dx} = \frac{1}{\sqrt{1-x^2}} \quad u < 1$	$\int \frac{dx}{\sqrt{a^2+x^2}} = \arcsin\left(\frac{x}{a}\right) + C$
$\frac{d(\arccos(x))}{dx} = -\frac{1}{\sqrt{1-x^2}} \quad u < 1$	$\int \frac{dx}{a^2+x^2} = \frac{1}{a} \arctan\left(\frac{x}{a}\right) + C$
$\frac{d(\arctan(x))}{dx} = \frac{1}{1+x^2}$	$\int \frac{dx}{u\sqrt{a^2-x^2}} = \frac{1}{a} \operatorname{arcsec}\left \frac{x}{a}\right + C$

1) Find the volume of the solid generated by revolving the function $y = f(x) = 4 + \sin(x)$ with $0 \leq x \leq 2\pi$ about the x -axis.

2) Find the area of the surface generated by rotating the loop of the curve $9y^2 = x(3 - x)^2$ about the x -axis.

3) A spring has natural length of 20 cm. Compare the work, W_1 , done by stretching the spring from 20 cm to 30 cm, to the work W_2 , done by stretching the spring from 30 cm to 40 cm. How are W_1 and W_2 related?

4) Solve the initial value problem

$$\frac{dy}{dx} = \frac{1}{x^2 + 1} - \frac{2}{\sqrt{1 - x^2}}, \quad y(0) = 2$$

5) Compute the following integral

$$\int x^2 \sin(2x) dx$$

6) Evaluate the integral

$$\int \sin^2(x) \cos^4(x) dx$$

7) Evaluate the integral

$$\int \frac{\sqrt{1+x^2}}{x} dx$$

8) Evaluate the following integral.

$$\int \frac{1}{x^2 - 1} dx$$

9) Evaluate the integral

$$\int_{-1}^0 \frac{e^{1/x}}{x^3} dx$$

THIS PAGE IS LEFT BLANK FOR ANY SCRATCH WORK

END OF TEST