

Name _____

Student number _____

Quiz section: _____

Problem	Total Points	Score
1	9	
2	6	
3	10	
4	15	
5	10	
Total	50	

Instructions

1. Print your name, student ID number and section number on this page. Do **NOT** separate the pages of the exam.
2. Print your name on each page of the exam as you check to see that your copy of the exam has 5 pages.
3. All work must be shown. You may use (without showing work) antiderivatives of the “standard” functions and their derivatives, all other integrals have to be evaluated even if you know them, have seen them in class or homework or if they are on your notes.
4. You may use a scientific calculator and one sheet (two-sided) of handwritten notes. Other notes, books or a graphing calculators are not allowed. If you need more space to solve a problem, use the back of the page preceding that problem.
5. Your answers should NOT be given as decimals, unless stated otherwise. For example, if the result is $\pi^2/4$, your answer should be $\pi^2/4$ and not 2.47. Simplify expressions as far as possible or reasonable.
6. Read each question carefully. Work the problems in an order that will maximize your score. Good Luck!

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1. (9 pts) Find a number c between π and 2π such that the average value of $f(x) = (\cos x)^2$ over the interval $[\pi, 2\pi]$ equals $f(c)$. Give your answer c as a decimal!

2. (6 pts) A tank full of water has the shape of a hemisphere. Its diameter is 10m. The density of water is $1000\text{kg}/\text{m}^3$. Set up an integral for the work required to pump the water out of the tank. DO NOT EVALUATE THE INTEGRAL.

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3. (10 pts) The (infinite) region below the x-axis and above the curve $y = \ln x$, $0 < x \leq 1$, is rotated about the y -axis. Is the volume of the resulting solid finite or infinite? If it is finite, find its value!

4. Evaluate the following 3 indefinite integrals.
(a) (5 pts)

$$\int \sin^3 x \tan^2 x \cos^2 x dx.$$

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(b) (5 pts)

$$\int \frac{dx}{\sqrt{4x^2 + 8x - 12}}$$

(c) (5 pts)

$$\int x \tan^{-1} x \, dx$$

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5. Evaluate the following 2 definite integrals. If they are improper, decide whether they are convergent or divergent before evaluating them.

(a) (5 pts)

$$\int_1^2 \frac{dx}{x^2(x+1)}$$

(b) (5 pts)

$$\int_0^\pi \tan x \, dx$$