

You are: _____
Name Section Student #

Problem	Total Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

Instructions

1. Print your **Name**, **Section** and **Student #** on this page.
Do **NOT** separate the pages of the exam. Check to see that your copy of the exam has 7 pages.
2. **SHOW ALL OF YOUR WORK.** Partial credit will only be given where you have made it clear that you understand part of the solution. Answers without justification may not receive full credit. The correct answer may receive no credit if you do not show how you arrived at that answer.
3. **GIVE EXACT ANSWERS.** You will lose points if you do not give the exact answer to a problem and instead provide a decimal approximation (for example, as supplied by your calculator).
4. You are allowed to use one $8\frac{1}{2} \times 11$ page of handwritten notes. Do not share notes. You may use a Ti-30x IIS calculator (no other brands or models are allowed). If you need more space to solve a problem, use the back of the page preceding that problem and indicate to the grader that you have done so.
5. Read each question carefully. Work the problems in an order that will maximize your score. Be clear and concise. **Good luck!**

1. (10 points) Evaluate the following integrals. Show all of your work.

(a) (5 points)

$$\int_0^1 v^2 \cos(2v^3) dv$$

(b) (5 points)

$$\int \tan \theta \ln(\cos \theta) d\theta$$

2. (10 points) If

$$f(x) = \int_0^{\sin x} \sqrt{1+t^2} dt \quad \text{and} \quad g(y) = \int_3^y f(x) dx,$$

find $g''(\pi/6)$. (Show all of your work.)

3. (10 points) An object is moving on the x -axis with acceleration

$$a(t) = 2t + 4 \quad \text{for} \quad 0 \leq t \leq 4.$$

Its velocity at time $t = 0$ is $v(0) = -5$.

(a) (5 points) What is the displacement of the object between times $t = 0$ and $t = 4$?

(b) (5 points) What is the total distance travelled by the object between times $t = 0$ and $t = 4$?

4. (10 points) Find the area of the region bounded by the curves

$$y = \frac{1}{1+x^2} \quad \text{and} \quad y = \frac{1}{2}.$$

Show all of your work and give your answer in exact form.

5. (12 points) Consider the region R bounded between the parabola $y = x^2$ and the line $y = 3x$.

(a) (2 points) Sketch the region.

(b) (4 points) Find the volume of the solid obtained by rotating the region R about the y -axis. (Set up a definite integral AND evaluate it.)

(c) (4 points) Set up a definite integral for the volume obtained by rotating the region R about the horizontal line $y = 10$.

You may either use the method of cylindrical shells, or the method of washers. Indicate your answer in one of the appropriate places below. If you write both integrals we will grade each out of 2 points. If you only write one we will grade it out of 4 points.

DO NOT EVALUATE EITHER INTEGRAL!

Either “Cylindrical Shells”:

or “Washers”: