

Each question topic and point value is recorded in the tables below. Note that this exam must be completed within the 50 minutes allotted. Also, you must work without any external resources, which includes no notes, calculator, nor any equivalent software. You must show an appropriate amount of work to justify your answer for each problem. If you run out of room for a given problem, you may continue your work on the back of the page.

By writing your name and signing the pledge you are stating that you understand the rules outlining this exam.

Scoring Table

Question	Points	Score
1	8	
2	9	
3	8	
4	10	
5	10	
Total:	45	

Topics Table

Question	Topic
1	Area between two curves
2	Volume of solid of revolution
3	Arc length and surface area
4	Integration Methods
5	Integration Methods

Reduction Formulas

$$\int \sin^n(x) dx = -\frac{1}{n} \cos(x) \sin^{n-1}(x) + \frac{n-1}{n} \int \sin^{n-2}(x) dx$$

$$\int \cos^n(x) dx = \frac{1}{n} \cos^{n-1}(x) \sin(x) + \frac{n-1}{n} \int \cos^{n-2}(x) dx$$

$$\int \tan^n(x) dx = \frac{1}{n-1} \tan^{n-1}(x) - \int \tan^{n-2}(x) dx$$

$$\int \sec^n(x) dx = \frac{1}{n-1} \sec^{n-2}(x) \tan(x) + \frac{n-2}{n-1} \int \sec^{n-2}(x) dx$$

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1. (a) (2 points) Sketch the region bounded by the curves $y = x$, $y = 4 - x$, and $x = 0$. Include points of intersection.

(b) (1 point) Write the area of the region as an integral with respect to x .

(c) (1 point) Write the area of the region as an integral with respect to y .

(d) (4 points) Find the area of the region.

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2. (a) (2 points) Sketch the region bounded by the curves $y = 6 - x^2$, $y = 0$, $x = 1$, and $x = 2$. Include points of intersection.
- (b) (1 point) Sketch the solid of revolution formed by revolving the region about the y -axis.
- (c) (1 point) Write the volume of the solid as an integral using the disk/washer method.
- (d) (1 point) Write the volume of the solid as an integral using the shell method.
- (e) (4 points) Find the volume of the solid.

3. (a) (1 point) Sketch the curve $y = \sqrt{x}$ over the interval $[1, 4]$.

(b) (1 point) Write the arc length as an integral.

(c) (1 point) Sketch the surface of revolution formed by revolving the curve about the x axis.

(d) (1 point) Write the surface area as an integral.

(e) (4 points) Find the surface area.

4. Evaluate the following indefinite integrals.

(a) (5 points) $\int \tan(x) \sec^2(x) dx$

(b) (5 points) $\int x \ln(x) dx$

5. Evaluate the following indefinite integrals.

(a) (5 points) $\int \frac{x^2}{\sqrt{4-x^2}} dx$

(b) (5 points) $\int \frac{x+5}{x^3+x} dx$