

Guidelines

- **Calculators are not allowed.**
- Read the questions carefully. You have 65 minutes; use your time wisely.
- You may leave your answers in symbolic form, like $\sqrt{3}$ or $\ln(2)$, unless they simplify further like $\sqrt{9} = 3$ or $\cos(3\pi/4) = -\sqrt{2}/2$.
- Put a box around your final answers when relevant.
- Show all steps in your solutions and make your reasoning clear. Answers with no explanation will not receive full credit, even when correct.
- Use the space provided. If necessary, write "see other side" and continue working on the back of the same page.

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1. (8 points) To be complete once exams are graded and returned. Please correct any problem with points deducted. All corrections should be completed neatly on a separate sheet of paper. Once you have finished your corrections, take your exam and corrections to the Office of Student Learning (OSL), and a tutor will check your answers and sign. The checked solutions should be given to your instructor.

2. (8 points) Find the area of the region bounded by $y = x^2$, $y = 2x^2 - 4x$, and $y = 0$.
3. The region R in the first quadrant bounded by the parabola $y = 4 - x^2$ and the coordinate axes is revolved about the y -axis to produce a dome shaped solid. Find the volume of the solid in the following ways.
- (6 points) Apply the disk method. Set up the integral, but do not evaluate.
 - (6 points) Apply the shell method. Set up the integral, but do not evaluate.
4. (6 points) The region bounded by the graphs of $y = (x - 2)^2$ and $y = 4$ is revolved about the line $y = 4$. What is the volume of the solid generated? Set up the integral, but do not evaluate.

5. (6 points) The region bounded by the graphs of $y = 6x$ and $y = x^2 + 5$ is revolved about the line $x = -1$. What is the volume fo the solid generated? Set up the integral, but do not evaluate.

6. (8 points) Find the length of the curve $y = \frac{x^3}{6} + \frac{1}{2x}$ for $1 \leq x \leq 2$.

7. (8 points) Let $f(x) = \sqrt{3x - x^2}$ on the interval $[0, 3]$. Find the area of the surface generated is when f is revolved about the x -axis.

8. (8 points) Find the surface area of a cone (excluding the base) with radius 4 and height 8 using integration and a surface area integral.

9. (6 points) An inverted conical tank (point down) is 2m high and has a base radius of $\frac{1}{2}$ m. If the tank is full of a liquid with density, ρ , how much work is required to pump the water to a level 1m above the top of the tank. Your answer can be in terms of ρ and g . Set up the integral, but do not evaluate.

10. (6 points) The face of a dam is shaped like a trapezoid. The length of the base is 10m, the length of the top is 20m with a height of 15m. If the dam is full of water, find the total force on the face of the dam. Set up the integral, but do not evaluate.

11. (8 points) Evaluate $\int_1^4 \frac{10\sqrt{x}}{\sqrt{x}} dx$.

12. (8 points) Evaluate $\int_0^{\ln 2} \tanh x dx$.

13. (8 points) Find $H'(x)$ where $H(x) = (x + 1)^{2x}$.

Question	Points	Score
1	8	
2	8	
3	12	
4	6	
5	6	
6	8	
7	8	
8	8	
9	6	
10	6	
11	8	
12	8	
13	8	
Total:	100	