

Math 2B make-up
Winter 2018
Midterm 1

Student's Name (Print): _____

Student's ID: _____

Discussion Section Code: _____

Print your name and student ID on the top of this page.

This exam contains 5 pages (including this cover page) and 7 problems. You may *not* use your books, notes, or any calculator in this exam. Do not write in the grading table below.

The following rules apply to the answers you provide in this exam:

- **Organize your work**, in a neat and coherent way.
- **Unsupported answers will not receive full credit.** Calculation or verbal explanation is expected.
- **If you need more space, use the back of the pages;** clearly indicate when you have done this.
- **Box your final answer** for full credit.

Question	Points	Score
1	15	
2	15	
3	5	
4	5	
5	5	
6	5	
7	10	
Total:	60	

1. (a) (5 points) Estimate the area under the parabola $y = x^2$ from $x = 0$ to $x = 5$ using 5 approximating (Riemann) rectangles and right endpoints.

- (b) (5 points) Is this an upper bound or lower bound on the actual area? Illustrate why.

- (c) (5 points) Using right endpoints, find an expression for the actual area as the limit of a Riemann sum. Do not evaluate your expression.

2. Evaluate the following:

(a) (5 points)

$$\int \frac{x \, dx}{1 + x^4} \quad \left[\text{Hint: } \frac{d}{du} \arctan u = \frac{1}{1+u^2}. \right]$$

(b) (5 points)

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

(c) (5 points)

$$\int_1^2 x \sqrt{x - 1} \, dx$$

3. (5 points) Given that $\int_0^9 f(x) dx = 4$, evaluate $\int_0^3 xf(x^2) dx$.

4. (5 points) Evaluate

$$\frac{d}{dx} \int_x^{x^2} e^{t^2} dt.$$

5. (5 points) Show that $f_{ave} > f(\frac{a+b}{2})$ over the interval $[a, b]$ where the graph of $f(x)$ is:

6. (5 points) Compute the average of $f(x) = 2xe^{-x^2}$ on $[0, 2]$.

7. (a) (5 points) Show that the volume of a sphere of radius r is $\frac{4}{3}\pi r^2$.

(b) (5 points) Find the volume of a pyramid whose base is square with side L and whose perpendicular height is h .