Math 2B 44370
Winter 2018
Midterm 1
Wed Jan 31 2018
10.00am

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 $x = 4$ using 4 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)

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

(b) (5 points)

$$\int x^3\sqrt{x^2+1}\,dx$$

(c) (5 points)

$$\int_1^2 \frac{e^{1/x}}{x^2}\,dx$$

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) A particle moves along a line with velocity $v(t) = 3t - 5$ at time t. Find the distance travelled in the time interval $[0, 3]$.

6. (5 points) Compute the area of the region enclosed by $y = 1/x, y = 1/x^2, x = 1$ and $x = 2$.

7. (a) (5 points) Find the volume of the solid obtained by rotating the region bounded by the curves $2x = y^2, x = 0$ and $y = 4$ about the y-axis.

   (b) (5 points) Set up an integral to find the volume of the solid obtained by rotating the region bounded by $y = x^3, y = 0$ and $x = 1$ about the axis $x = 2$. Do not evaluate the integral.