

Show all work. **Circle your answer.**

No books, no notes, no calculator, no cell phones, no pagers, no electronic devices at all.

Solutions will be posted shortly after the exam: www.math.wisc.edu/~miller/m217

Name_____

Hand in to your TA – Circle your DIScussion section (column one):

DIS 321	7:45 TR	901 Van Vleck	Forray, Susan Jane
DIS 322	8:50 TR	6224 Soc Sci	Bisgard, James William
DIS 324	9:55 TR	123 Ingraham	Bisgard, James William
DIS 326	11:00 TR	B235 Van Vleck	Leete, Jennifer A.
DIS 327	11:00 TR	113 Ingraham	Lu, Tianshi
DIS 328	12:05p TR	B235 Van Vleck	Leete, Jennifer A.
DIS 329	12:05p TR	6228 Soc Sci	Lu, Tianshi
DIS 330	1:20p TR	B321 Van Vleck	Forray, Susan Jane
DIS 332	2:25p TR	B135 Van Vleck	Hur, Youngmi
DIS 334	3:30p TR	B329 Van Vleck	Hur, Youngmi

Problem	Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
Total	60	

1. (10 pts) The area bounded by the curves $y = x^3$, $y = 0$, and $x = c > 0$ has area 1. What is c ?

2. (10 pts) The base of a certain solid is the region bounded by the curves $y = x^2$ and $y = 1$. Each plane section of the solid cut out by a plane perpendicular to the x -axis is a square with one edge of the square in the base of the solid. Find the volume of the solid.

3. (10 pts) The area bounded by the curves $y = \sqrt{x}$ and $y = x$ is rotated about the y -axis. Find the volume.

4. (10 pts) Find the length of the curve $x^2 = 4y^3$ from $(0, 0)$ to $(2, 1)$.

5. (10 pts) Find the surface area of the surface generated by rotating about the line $y = 1$ the arc of the curve $y = \frac{x^3}{3} + 1$ between $x = 0$ and $x = 1$.

6. (10 pts) Prove the following part of the fundamental theorem of calculus:

Suppose $f(x)$ is continuous on the interval $[a, b]$, $F(x)$ is continuous on $[a, b]$ and differentiable on (a, b) with the $F'(x) = f(x)$ for all x in (a, b) . Let n be a large integer.

Define $\Delta x = \frac{b-a}{n}$.

Define $x_k = a + k\Delta x$ for $k = 0, 1, \dots, n$.

Show there exists c_k with $x_{k-1} \leq c_k \leq x_k$ for $k = 1, 2, \dots, n$ and such that

$$F(b) - F(a) = \sum_{k=1}^n f(c_k) \Delta x$$

Answers

1. $c = \sqrt{2}$

2. $\frac{16}{15}$

3. $\frac{2\pi}{15}$

4. $\frac{2}{27}(10^{3/2} - 1)$

5. $\frac{\pi}{9}(2^{3/2} - 1)$

6. See Exam 1 problem 6.