

MATH 2260

Midterm Exam I

February 18, 2015

NAME (please print legibly): _____

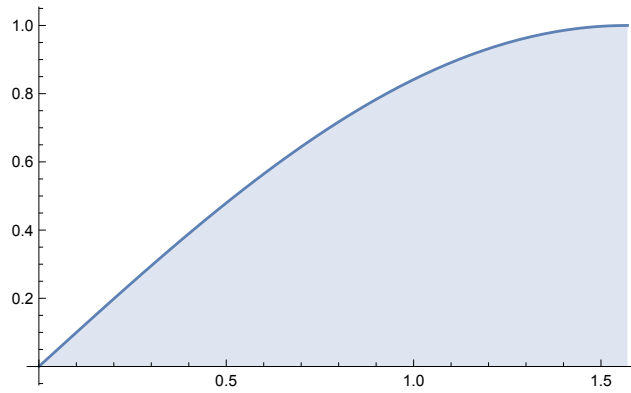
Your University ID Number: _____

Please complete all questions in the space provided. Draw a box around your final answer. You may use the backs of the pages for extra space, or ask me for more paper if needed. Work carefully, and neatly (2 points on every problem are given for clear presentation of your work or deducted for unclear, messy, or hard-to-understand work).

Try to complete the problems you find easier before going back to the harder ones. Good luck!

QUESTION	VALUE	SCORE
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
TOTAL	90	

1. (10 points) Find the volume of the solid created by rotating the area (shown) between the curve $y = \sin x$, the x -axis, and the line $x = \pi/2$ around the y -axis.



2. (10 points) Find the length of the portion of the graph of the function

$$f(x) = \frac{x^2}{2} - \frac{\ln x}{4} \quad (1)$$

for x from 1 to 3. (Set up the integral correctly: 6 points. Do the integral: 4 points).

3. (10 points) A particle at position x experiences a force $F(x) = k/x^2$. Set up and evaluate the integral for the work done by $F(x)$ as the particle moves from a to b . (Your answer will be in terms of k , a , and b .)

4. (10 points) Find the solution of the differential equation

$$\frac{dy}{dx} = x^2 \sqrt{y}$$

where $y(1) = 0$.

5. (10 points) Integrate

$$\int \sin^5 x \, dx$$

6. (10 points) Integrate

$$\int \frac{\sqrt{9-x^2}}{x^2} dx.$$

7. (10 points) The table below gives some values for the function

$$f(t) = \text{“air temperature at the Athens, GA weather station at time } t\text{”},$$

where temperature is given in degrees Fahrenheit and t is measured in hours starting at 6am on January 1, 2015 (time 0).

Use this data to estimate the **average** air temperature at the Athens weather station between 6am and 6pm on January 1, 2015 using Simpson’s rule. (Bonus +3 pts: Check your answer using the Trapezoid rule.)

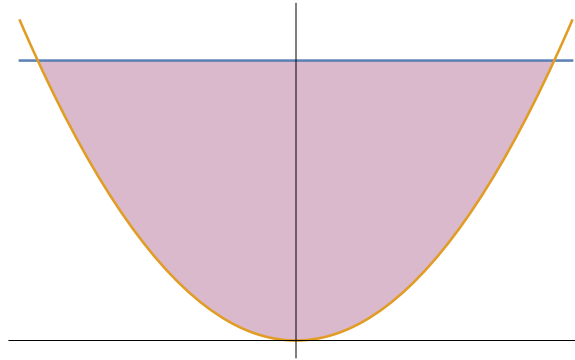
The table has additional (blank) columns for your use.

t	f(t)			
0	39.92			
3	41			
6	41.36			
9	39.92			
12	37.22			

8. (10 points) Evaluate the **improper** integral

$$\int_0^1 \frac{1}{x^{1/3}} dx.$$

9. (10 points) Bonus Credit (hard):



Prove that for any values of $p > 0$ and $a > 0$ the plate between $y = \frac{x^2}{4p}$ and $y = a$ of uniform density has center of mass $(0, \frac{3}{5}a)$.