

MATH 1311 FALL 2016

CALCULUS I



THIRD MIDTERM EXAM

FRIDAY, DECEMBER 2

YOUR NAME (PLEASE PRINT):

Instructions: This is a closed book, closed notes exam. **Use of calculators or other electronic devices such as cell phones, mp3 players, etc. is not permitted.** Except in multiple choice problems, you must justify all of your answers to receive credit. Unjustified answers and/or disorganized or otherwise illegible work will receive partial credit at best. Notation is important, and points will be deducted for incorrect use. Please do all of your work on the paper provided.

The Honor Code requires that you neither give nor receive any aid on this exam.

Please indicate that you have read and understood these guidelines by signing your name in the space provided:

Pledged: _____

Do not write below this line

Problem	1	2	3	4	5	6	7	8
Points	5	5	5	5	15	10	20	15
Score								

Total:_____

1. If $\int_4^9 f(x) dx = 3$ then $\int_2^3 xf(x^2) dx$ is equal to:

a. 6

b. 9

c. $\sqrt{3}$

d. $3/2$

2. If $g(x) = \int_0^{x^2} \frac{t}{1+t^3} dt$ then $g'(x)$ is equal to:

a. $\frac{x}{1+x^3}$

b. $\frac{2x^3}{1+x^6}$

c. $\frac{x^2}{1+x^6}$

d. $\frac{2x^2}{1+x^3}$

3. Evaluate

$$\lim_{n \rightarrow \infty} \frac{1}{n} \left(\left(\frac{1}{n} \right)^3 + \left(\frac{2}{n} \right)^3 + \left(\frac{3}{n} \right)^3 + \cdots + \left(\frac{n}{n} \right)^3 \right).$$

a. $1/4$

b. $1/2$

c. 0

d. 1

4. If $\int_{-1}^2 f(x) dx = 7$ and $\int_{-1}^2 g(x) dx = 12$ then $\int_{-1}^2 [2f(x) + 3g(x)] dx$ equals:

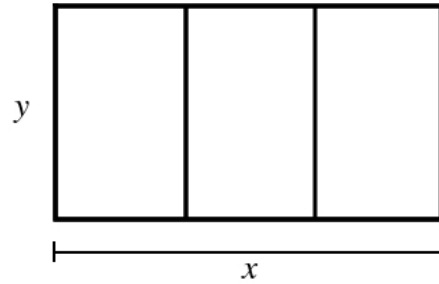
a. 19

b. 50

c. Cannot be determined

d. 45

5. A farmer wants to fence an area of 1.5 million square feet in a rectangular field and then divide it into thirds with additional fencing as shown in the diagram below. What dimensions will minimize the total length of fencing used?



6.

a. Verify that $F(x) = \sin x - x \cos x$ is an antiderivative of $f(x) = x \sin x$.

b. Use part **a** to evaluate $\int_0^\pi x \sin x \, dx$.

7. Evaluate the integral.

a. $\int_0^8 \frac{x}{\sqrt{x+1}} dx$

b. $\int v(v^2 + 2)^{30} dv$

c. $\int_1^8 \sqrt[3]{\frac{5}{x}} \, dx$

d. $\int_{-1}^1 [e^{2z} - \cos \pi z] \, dz$

8. Find the total area trapped between the curve $y = 2x - x^2 - x^3$ and the x -axis.