

Math 158

Wednesday, February 7, 2001

Instructor: Murray Martin **Midterm #1 Examination** 17:30-18:30 AQ3154

This examination has 10 questions, worth a total of 40 marks. The numbers in the margin indicate the marking scheme.

Last Name (Please print): _____

First Name: _____

Student Number: _____

Instructions

1. **Time:** 60 minutes
2. Fill in the information above.
3. Please do not open the examination booklet until you are told to do so
4. Attempt all questions
5. Full marks will not be given unless appropriate work is shown.
6. You may use the back of the pages for rough work.
7. You may use pen or pencil to write the exam. However, exams written in pencil are not eligible for remarking.
8. No calculators allowed.

Question	Marks
1-6	
7	
8	
9	
10	
Total	
	40

2 1. Evaluate the indefinite integral $\int (x^2 + 1)^2 dx$

A. $\frac{(x^2 + 1)^3}{3} + C$

D. $\frac{2x(x^2 + 1)^3}{3} + C$

B. $\frac{(x^2 + 1)^3}{6x} + C$

E. $\frac{x^3}{5} + \frac{2x^3}{3} + x + C$

C. $\left(\frac{x^3}{3} + x\right)^2 + C$

Answer: _____

2 2. If $f(x) = \begin{cases} x & \text{for } x \leq 1 \\ \frac{1}{x} & \text{for } x > 1 \end{cases}$, then $\int_0^e f(x) dx$ equals

A. 0

D. e

B. $\frac{3}{2}$

E. $e + \frac{1}{2}$

C. 2

Answer: _____

2 3. If $\int_a^b f(x) dx = 5$ and $\int_a^b g(x) dx = -1$, which of the following must be true?

I. $f(x) > g(x)$ for $a \leq x \leq b$

II. $\int_a^b [f(x)g(x)] dx = -5$

III. $\int_a^b [f(x) + g(x)] dx = 4$

A. I only

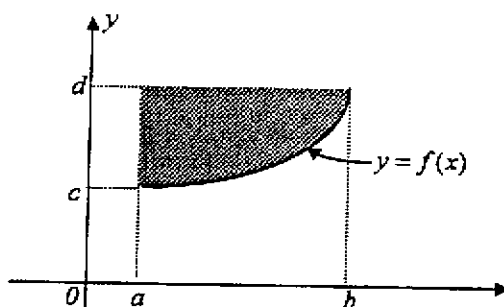
D. II and III only

B. II only

E. I, II, and III

C. III only

Answer: _____



- 2 4. Which of the following represents the area of the shaded region in the figure above?
- A. $\int_c^d f(y) dy$ D. $(b-a)[f(b)-f(a)]$
 B. $\int_a^b (d-f(x)) dx$ E. $(d-c)[f(b)-f(a)]$
 C. $f'(b)-f'(a)$

Answer: _____

- 2 5. The $\int x f(x) dx$ equals

- A. $x f(x) - \int x f'(x) dx$ D. $\frac{x^2}{2} f(x) - \int \frac{x^2}{2} f'(x) dx$
 B. $x f(x) - \int f'(x) dx$ E. $\frac{x^2}{2} \int f(x) dx$
 C. $x f(x) - \frac{x^2}{2} f(x) + C$

Answer: _____

- 2 6. The $\int_0^1 x^3 e^{x^4} dx$ equals

- A. $\frac{1}{4}(e-1)$ D. e
 B. $\frac{1}{4}e$ E. $4(e-1)$
 C. $e-1$

Answer: _____

7. Find the area bounded by the curves $y = x$ and the parabola $y^2 = x + 12$.
(Hint: Sketch the graph of the two curves)

[7] 8. [4] a) Express $\frac{x^2 - 2}{x(x^2 + 2)}$ as a sum of partial fractions.

[3] b) Hence or otherwise evaluate $\int \frac{x^2 - 2}{x(x^2 + 2)} dx$

- [6] 9. A manufacturer's marginal - cost function is

$$\frac{dc}{dq} = \frac{500}{\sqrt{2q+25}}$$

If c is in dollars, determine the cost involved to increase production from 100 to 300 units.

[8] 10. [4] a) The $\int \sqrt{10^{bx}} dx = \frac{a\sqrt{10^{bx}}}{b} + C$, where C is a constant. Find a and b .

[4] b) Find $\int \frac{xe^x}{(x+1)^2} dx$