

**MAT 211**

**Spring 2026  
Practice Exam 2B**

**Instructor:**

**NAME: (PRINT!!)** \_\_\_\_\_

**Honor Statement:**

By signing below, you confirm that you have neither given nor received any unauthorized assistance on this exam. This includes any use of a graphing calculator beyond those uses specifically authorized by the Mathematics Department and your instructor. Furthermore, you agree not to discuss this exam with anyone until the exam testing period is over and this exam has been returned to you.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**Test Information:**

- This test has 12 questions worth 100 points total.
- Multiple choice: 5 points each,
- True/False: 2 points each,
- Free Response points are as marked.
- You have 50 minutes to complete the exam.
- **Section I:** For the 6-multiple choice questions, list your answers in the answer grid at the end of this section (after Question #6). Work will not be graded; no partial credit is available.
- **Section II:** For the 5 true/false questions, circle your answer. Work will not be graded; no partial credit is available.
- **Section III:** For free response questions, show all work in the area provided by the questions. Partial credit may be available for these problems with appropriate work; however correct final answers without sufficient supporting work may receive zero credit.
- Do not round or approximate your answers unless otherwise indicated.
- There is extra scratch paper on the last page. If you want your work on the scratch paper to be considered for problems in Section III, make sure to clearly indicate under the particular problem where the work can be found and number it on the scratch paper.
- You may use a calculator so long as it does NOT perform symbolic algebra.
- **For example, Casio FX2, Casio 9970G, TI-89, TI-92, or TI-nspire CAS are not permitted.** Sharing of calculators is also not permitted.
- Cell phones *may not* be accessed besides when the instructor/proctor is checking ID and must be set to silence.

## Section I: Multiple Choice

Circle the response that best completes the statement or answers the question. Then write the letter of your answer in the table after Problem 6.

---

1) Let  $F(x)$  be the antiderivative of the function,  $f(x) = \frac{x^2+x+5}{x^2}$ . Find,  $F(x)$ .

A.  $F(x) = \frac{\frac{x^3}{3} + \frac{x^2}{2} + 5x}{\frac{x^3}{3}} + C$

B.  $F(x) = x + \ln|x| - \frac{5}{x} + C$

C.  $F(x) = x + \ln|x| + \frac{5}{x} + C$

D.  $F(x) = x + \ln|x| + \frac{5}{3x^3} + C$

E. None of these

---

2) If  $\int_{-2}^2 (x^3 + k) dx = 12$ . Find the value of  $k$ .

A. 1

B. 12

C. 3

D. -3

E. None of these

---

3) Evaluate  $\lim_{x \rightarrow -\infty} \frac{15x^3 + 5x^2 + x}{2 - 3x}$ .

A.  $-\infty$

B.  $\infty$

C. 0

D. 5

E. None of these

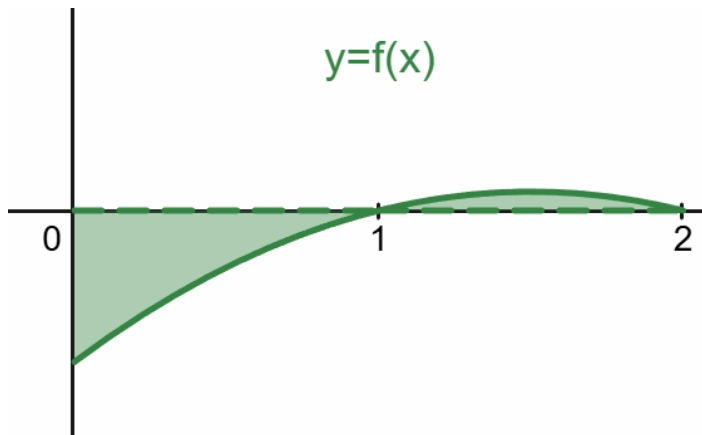
4) If the substitution  $u = 3x^2 + 1$  is used, then  $\int_0^1 \frac{x}{\sqrt{3x^2+1}} dx$  is equivalent to

- A.  $\int_0^1 \frac{x}{\sqrt{u}} du$       B.  $\frac{1}{6} \int_0^1 \frac{1}{\sqrt{u}} du$       C.  $\frac{1}{6} \int_1^4 \frac{1}{\sqrt{u}} du$       D.  $6 \int_1^4 \frac{1}{\sqrt{u}} du$   
E.  $6 \int_1^4 \frac{x}{\sqrt{u}} du$
- 

5) If  $\int_a^c f(x) dx$  is the total accumulation of area from  $x=a$  to  $x=c$ , and  $b$  is a point between  $a$  and  $c$ , then the integral of  $f(x)$  from  $x=a$  to  $x=c$  equals

- A.  $\int_a^b f(x) dx + \int_b^c f(x) dx$       B.  $2 \int_a^b f(x) dx$   
C.  $\int_a^b f(x) dx - \int_b^c f(x) dx$       D.  $\int_b^a f(x) dx + \int_c^b f(x) dx$   
E. None of these
- 

6) Suppose the area for the graph  $f(x)$  below from 0 to 1 is 5 and the area from 1 to 2 is 3. Which of the following represents the total net change (area) for  $f(x)$ .



- A. 8      B. 2      C. -2      D. -8      E. None of these

Enter your answers to **Section I** problems here **5 points each**.

Question	#1	#2	#3	#4	#5	#6
Answer						

## Section II: True/False

Circle either T or F for each part. [2 points each]

---

7)

- a) If  $g'(x)$  is continuous on  $[1, 3]$ , then  $\int_1^3 g'(x) dx = g(3) - g(1)$  T or F
- b)  $\lim_{x \rightarrow -\infty} 4e^{-9x} = 0$  T or F
- c) If  $f(x) \geq 10$  on  $[1, 2]$ , then  $\int_1^2 f(x) dx \geq 10$  T or F
- d)  $\int_a^a f(x) dx = 0$  T or F
- e)  $\int_1^2 xf(x) dx = x \int_1^2 f(x) dx.$  T or F

## Section III: Free Response

You must show your work in the space provided to receive full credit.  
Correct final answers without sufficient supporting work may receive zero credit.

Please put a box around your final answers.

---

- 8) Suppose Jake finds that his company's profit function can be modelled by  $P'(x) = 5x^4 - 24x$  dollars per item represents the marginal profit of producing  $x$  items for his company. If the total profit of producing 3 items is \$150.
- a. Find the total profit function,  $P(x)$  for producing  $x$  items **[8 points]**
- b. What is the total profit of producing 5 items. **[3 points]**

9) Find the average value of  $P(t) = 2000e^{0.05t} + 20$  on the interval  $[0,10]$ .  
Round to the nearest whole number. **[10 points]**

10) In a subscription business, acquisition means new customers joining and churn means customers leaving. Let  $A(t)$  be the acquisition rate (customers/day) and  $C(t)$  the churn rate (customers/day). Suppose that  $A(t) = 80 - 0.2t$ ,  $C(t) = 26 + 2e^{0.01t}$ ,  $t \geq 0$ . Find the net change in customers over the first 10 days. [i.e integral of  $A(t)-C(t)$  from  $t=0$  to  $t=10$ ]  
Round your answer to two decimal places. **[11 points]**

11) Evaluate the following using *U-Substitution*.

a)  $\int 4x(x^2 - 1)^3 dx$  [7 points]

b)  $\int_0^4 \frac{1}{\sqrt{2x+1}} dx$  [9 points]

12) Determine whether the integral is divergent or convergent. If it is convergent, evaluate it. If the quantity diverges, enter 'DIVERGES'

a)  $\int_1^{\infty} \frac{1}{x^4} dx$  [6 points]

b)  $\int_5^{\infty} 10e^{5x} dx$  [6 points]