

Math 107: Calculus II, Spring 2014: Midterm Exam I
Monday, March 2 2015

Give your **name**, TA and section number:

Name:

TA:

Section number:

1. There are 4 questions for a total of 100 points. The value of each part of each question is stated.
2. **Do not open your booklet until told to begin.** The exam will be 50 minutes long.
3. You may **not** use phones, calculators, books, notes or any other paper. Write all your answers on this booklet. If you need more space, you can use the back of the pages.
4. **Unless specified otherwise, you must show ALL your working and explain your answers clearly to obtain full credit!**
5. **Read the questions carefully!** Make sure you understand what each question asks of you.

Please read the following statement and then sign and date it:

“I agree to complete this exam without unauthorized assistance from any person, materials, or device.”

Signature:

Date:

| Question | Points | Score |
|----------|--------|-------|
| 1 | 25 | |
| 2 | 24 | |
| 3 | 21 | |
| 4 | 30 | |
| Total: | 100 | |

1. (a) (10 points) Write the correct **form** of the partial fraction decomposition of the following rational function. **Do not** evaluate the undetermined coefficients.

$$\frac{x^3 + 2x - 5}{x^2(x^2 - 16)(x + 4)(x^2 + 4)}$$

(b) (15 points) Compute the indefinite integral $\int \frac{2x^3 + 2}{x^2 + 4} dx$. **Show all your work!**

2. (a) (12 points) Compute the improper integral $\int_1^{\infty} \frac{dx}{x^2}$. **Show all your work!**

(b) (12 points) Does the improper integral $\int_1^{\infty} \frac{dx}{\sqrt{3+x^4}}$ converge or diverge? **Show all your work!**

3. (21 points) Are the following statements true or false? Write **clearly** either **TRUE** or **FALSE** in the answer lines. Write the **whole word** and **not just T or F**, because T and F can look similar.

No justification is needed! For some of the questions, you might want to do some computations to figure out the answer. **The next page has intentionally been left blank for scratch work for this question.** However, **only the answer of True or False** will be graded.

- (a) There are more combinations of n objects taken k at a time than there are permutations of n objects taken k at a time (assuming $k > 1$).

(a) _____

- (b) For any events A and B of a sample space, we have an equality of conditional probabilities $P(A | B) = P(B | A)$.

(b) _____

- (c) Suppose we toss 2 fair dice. Let A be the event that the first die is 3 and B the event that the sum of the dice is 6. The events A and B are independent.

(c) _____

- (d) Suppose we toss 2 fair dice. Let A be the event that the first die is 3 and B the event that the sum of the dice is 7. The events A and B are independent.

(d) _____

Note for the following questions: The graphs of x^5 and of $\frac{1}{x^5}$ are both symmetric around the origin.

- (e) The improper integral $\int_{-\infty}^{\infty} x^5 dx$ converges to 0.

(e) _____

- (f) The integral $\int_{-1}^1 \frac{dx}{x^5}$ is equal to 0.

(f) _____

- (g) The integral $\int_{-1}^1 x^5 dx$ is equal to 0.

(g) _____

Use this page if you need more space for **scratch work** for the previous exercise.

Nothing on this page will be graded !

4. (a) (15 points) Two cards are chosen at random from a pack of 52 playing cards. What is the probability that at least one of them is a face card (Jack, Queen or King)?

(Carry out the computation until the end to get the answer.)

Show all your work!

- (b) (15 points) Suppose that half of the people in the class like math and half of the people do not like math. A test has been created to determine who likes math and who does not. However the test is not completely accurate: only 90% of the people who like math pass the test, and 30% of the people who do not like math manage to pass the test anyway.

If you have passed the test, what is the probability that you actually like math? (Carry out the computation until the end to get the answer.)

Show all your work!