WRITING ASSIGNMENTS

Note to Students

Your responses to the writing assignments will vary in length and type. Some assignments ask you to interpret calculus or mathematical concepts using nonmathematical language or to find examples of these concepts in nonmathematical contexts. Other assignments ask you to delve more deeply into the concepts and ideas themselves and to justify or explain some of the fine points that you may not have considered previously. Or you may be asked for your personal reflections and thoughts. On all of the assignments, take the time to write and rewrite. Many of the questions involve more than you may originally imagine. A second or third look at the question and your answer may be helpful. Feel free to consult textbooks, teachers, peers, or other sources when doing any of these writing assignments.

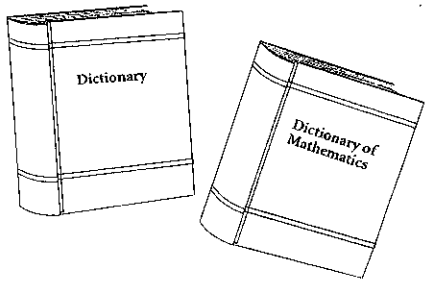
WRITING ASSIGNMENT 2

A Function by Any Other Name

In this assignment you will compare a nonmathematical definition of a term used in mathematics with a mathematical one.

- Write a nonmathematical definition of "function," and describe how you might use this word outside of mathematics. Avoid using a dictionary definition. Think about how you use the word in everyday language.
- Write a mathematical definition of "function" in your own words—not the definition you found in your mathematics textbook.
- Compare the two definitions you wrote. What similarities are there? How are they different?

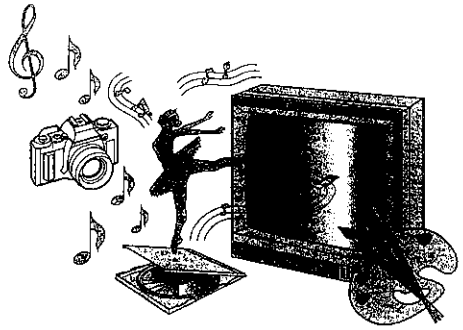
Be as complete as possible in your discussion.



WRITING ASSIGNMENT 3

Take It to the Limit

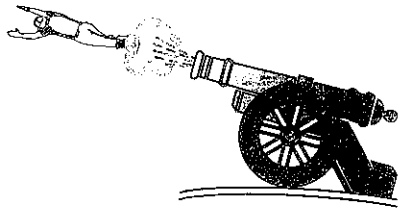
While limits are a fundamental concept in calculus, the idea of a limit can be found elsewhere. Music, visual arts, advertising, and other areas of popular culture often use the concept. Find an example of a song, poem, picture, or other item and explain how it uses or demonstrates the concept of a limit.



WRITING ASSIGNMENT 4

A Moving Experience

You have worked many examples of motion problems. Many of these problems involve the motion of a projectile. Try creating one of these problems. Don't just change the numbers from one of the book problems. Try to be more creative. Projectiles can be anything from rocks to pianos. They can be thrown, catapulted, launched, or in any other way sent into the air. Whatever you decide to use, ask questions such as "How high did it go?" "When will it reach the maximum height?" "When will it strike the ground?" "What was its speed upon impact?" In addition to asking the questions, provide a detailed solution to the problem.

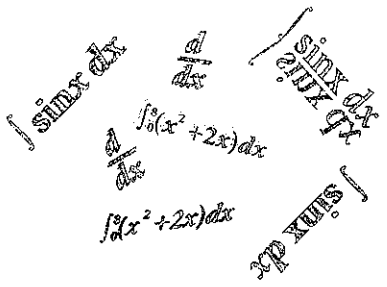


Write a background story that is at least a page long. It should ends with asking at least 4 questions involving parametric equations.

WRITING ASSIGNMENT 6

The Same, Yet Different

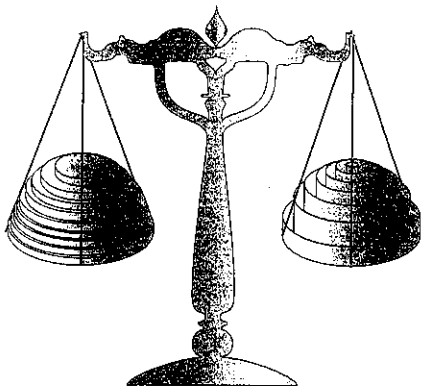
It has been said that calculus is the study of three things: derivatives, integrals, and integrals. The two types of integrals, definite and indefinite, are similar yet very different. Explain the similarities and differences between the two types of integrals. Then explain how the Fundamental Theorem of Calculus connects all three things: derivatives, integrals, and integrals. Do not just quote your textbook. Try to put these ideas into your own words.



WRITING ASSIGNMENT 7

Heads or Tails, Disks or Shells

There are two methods for finding the volume of a solid of revolution: the disk/washer method and the shell method. How do you decide which method to use? Does it make a difference? Are there situations where one is better than the other? Create examples to demonstrate your reasoning.



WRITING ASSIGNMENT 8

The Game's Afoot

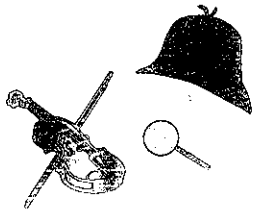
The following is a synopsis of the first part of an unpublished story. Your task is to solve the mystery and write the rest of the story. Your conclusion must include the mathematics of the solution. It should be written in story form and incorporate the mathematics within the dialogue and other prose as smoothly and naturally as possible. Be creative, but don't arrest the wrong individual!

The Case of the Cooling Corpse

It was a dark and stormy night. Holmes and Watson were called to the scene of the murder by Inspector Lestrade of the police. The victim was a wealthy but cruel man. He had many enemies.

The most likely suspects are the wife, the business partner, and the butler. Each has an equally strong motive. Each also has an alibi. The wife claims to have spent the entire evening at the theater across town. She was seen leaving the theater at 10:30 p.m. and returned home at 11:00 p.m., going straight up to her bedroom. Her return was verified by the upstairs maid. The business partner claims to have spent the evening working on papers at the office. His wife and household staff verified that he returned home at 10:30 p.m. The butler was on his night off. He claims to have been at the local pub until 10:00 p.m. The butler returned to his quarters above the carriage house at 10:05 p.m. and did not leave. This was verified by the other servants.

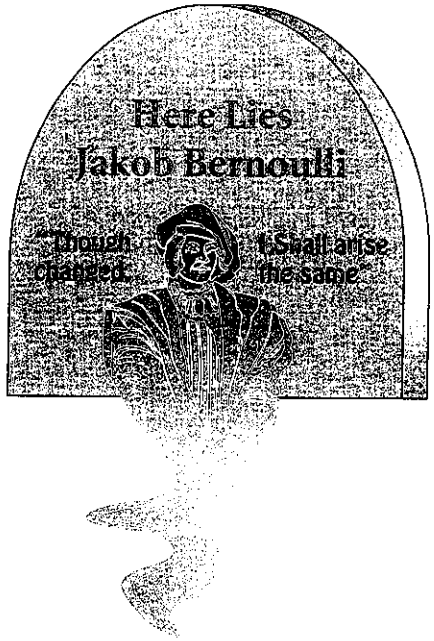
The body was found in the victim's study. Holmes arrived at the scene at 4:30 a.m. The room was unusually warm and stuffy. One of the police officers went to open a window. Holmes admonished him to delay that action until he had completed his investigation of the crime scene. He instructed Watson to determine the temperature of the body. This was found to be 88.0°. Holmes questioned the servants as to the room temperature during the evening and learned that the man had liked the room warm and that the temperature in the study was always very near the current 76°. Holmes asked Watson to take the temperature of the body again at the conclusion of his inspection of the scene, two hours after the first reading. It was 85.8°.



WRITING ASSIGNMENT 9

Story Time

Write a story involving an exponential function built on this quote expressed by Jakob Bernoulli, a great Swiss mathematician: "Though changed, I shall arise the same." The quote may show up as a moral or punch line. The exponential function may take on a life of its own or something in the story may be growing or decaying exponentially. This is not an essay on exponential functions. It is a work of fiction. Be creative.



WRITING ASSIGNMENT 10

Why Do We Have to Learn This?

Why should you learn the techniques of integration, such as integration by parts, trigonometric substitution, and partial fractions? Computers and even some graphing calculators can do integration analytically much more quickly than you will ever be able to do so by hand. Should these techniques be dropped from the course completely? What emphasis do you feel should be placed on pencil and paper integration in general? Just how much is necessary or beneficial to learn of these skills? Justify your answer.

$$\int \ln\left(\sqrt{x} + \sqrt{1+x}\right) dx$$

$$\int \frac{\cos x \, dx}{\sqrt{4 - \cos^2 x}}$$

WRITING ASSIGNMENT 11

What Was It All About Anyway?

Now that you are approaching the end of the course, consider all you have learned. Just exactly what is calculus anyway? Be complete and yet concise in your answer.