

College of the Redwoods  
Mathematics Department

Math 50C — Multivariable Calculus  
Quiz #4

David Arnold

## Quiz Questions

**Read Carefully!** You have until Friday (10/5/07) to complete the quiz. The quiz is due at the beginning of class on Friday (10/5/07). Late quizzes are not accepted.

This quiz is open notes, open book. This includes any supplementary texts or online documents. You must answer all of the exercises on your own. You are not allowed to work in groups or pairs on the quiz. You are not allowed to enlist the aid of a tutor or friend to help with the quiz. You are not allowed to read the exercises in the quiz, then seek help on similar questions. Once you open the quiz and read the questions, you may not seek any outside help of any kind.

I am not interested in reading pages and pages of calculations without accompanying narrative. It is essential that you include sound mathematical writing that both explains and justifies your solution or proof. Grammar and punctuation are important, as is the organization of your solution on the written page.

When working in the lab, please do not work at a terminal next to any other student who is also working on the quiz. For the sake of propriety, please separate yourselves when working on the quiz in the lab. Know that PS110 is also available for computer work. You can log onto the computers in PS110 and obtain files in your account in exactly the same manner as in PS116.

For information on transferring files from home, see the links for connecting to MSEM Mac from both PC's and Macs on the syllabus.

<http://online.redwoods.edu/instruct/darnold/MULTCALC/Syl1.htm>

Place the solution to each exercise on a separate sheet of paper. On a good sheet of paper, write out (longhand) and sign the following honor pledge.

I promise that all work found herein is my own. I have received no help from tutors, colleagues, or other teachers. I also promise that I have refrained from sharing my work and ideas with other students in the class. I have also honored all of the quiz constraints listed in the directions.

Arrange your solutions in order, place these quiz page(s) on top of your solutions, then place the honor pledge on top of the quiz as a cover sheet. Staple. Good luck!

EXERCISE 1. You're given the vectors

$$\mathbf{a} = \langle 1, -2, 2 \rangle, \quad \mathbf{b} = \langle 2, 0, 2 \rangle, \quad \text{and} \quad \mathbf{c} = \langle -1, -1, 1 \rangle.$$

Use pencil and paper calculations to determine each of the following items. In each exercise, include a carefully labeled diagram.

- Determine the vector projection of  $\mathbf{a}$  onto  $\mathbf{b}$ .
- Determine the area of the parallelogram spanned by the vectors  $\mathbf{b}$  and  $\mathbf{c}$ .
- Determine the volume of the parallelepiped spanned by the vectors  $\mathbf{a}$ ,  $\mathbf{b}$ , and  $\mathbf{c}$ .

EXERCISE 2. Use a strictly vector approach to determine the coordinates of the point that lies one-fifth of the way from the point  $P$  to the point  $Q$  on the segment  $PQ$ . Please include a carefully labeled diagram with your solution.

EXERCISE 3. Consider the two planes having equations

$$x + 2y - z = 4 \quad \text{and} \quad 2x + y - 2z = 4.$$

- (a) The two given planes intersect and form a line in space. Using pencil and paper calculations, determine the equation of the line. Please include a carefully labeled diagram with your solution.
- (b) Use Matlab to sketch the two planes and their line of intersection found in part (a). Color and annotate your plot appropriately. Include a printout of your result and a printout of the script file that produced your result with your examination pages.