Calculus III (MAC 2313-17772)
Homework #2
Due date: Monday, September 27, 2004.

Yes, again a lot of exercises, but some are really quite easy. And you have to do a LOT of exercises to learn the material.

**Instructions** For full credit, homework must be handed in by the end of the class on the day that it is due. Otherwise, the following penalties may be assessed.

- Homework handed in later on that same day: 5% reduction in the grade.
- Homework handed in past the due date, but before the end of the next class: Grade reduced by 20%.
- Homework handed in after the class following the due date is over, but within the same week: 50% reduction in the grade.
- Homework handed in past the week of the due date: 100% reduction in the grade.

In writing out your homework, make sure that each problem is clearly identified and appears as a unit. You should not start (say) problem 3, then interrupt to do (say) problem 4, return to problem 3 later. Your work should be easy to read. You should explain what you are doing. If I find a problem hard to read, I may simply ignore it. Moreover, **I may decide not to grade every problem, just a selection.** In that case, if I have difficulties finding one of the selected problems, I may assume that you didn’t do it.

Answers to the homework may be posted on some occasions. Whether I post answers or not, you should always feel free to see me to discuss your homework, and find out how the exercise should have been done (in case I marked you down).

1. The position vector of particle moving in space is given by
   \[ \mathbf{r}(t) = \langle 3 \cos t, 4 \sin t, t \rangle \]
   for \( 0 \leq t \leq 2 \). This is a spiral (or helicoidal) path. At time \( t = 2 \), the particle escapes along the tangent to the path, at a uniform speed. Determine the position of the particle at time \( t = 3 \).

2. Section 13.3, Exercises # 2, 14, 40, 42. (For those of you using the fourth edition, the exercises are #2, 12, 34, 36).

3. Section 13.4, Exercises # 10, 16, 22, 36. (For those of you using the fourth edition, the exercises are #10, 16, 22, 32).
4. Section 13.4, #28. Since this exercise does not appear in the fourth edition, here it is written out.

A batter hits a baseball 3 ft above the ground toward the center field fence, which is 10 ft high and 400 ft from home plate. The ball leaves the bat with speed 115 ft/s at an angle of 50° above the horizontal. Is it a home run? (In other words, does the ball clear the fence?)

5. Section 14.3 (we skip 14.1, 14.2) #4\(^1\), 8, 16, 18, 50, 64.

(For those of you using the fourth edition, the exercises are #4, 6, 14, 16, 48, 62).

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\(^1\)Won’t be graded, but try to do it anyway