Math 14 Winter 2004

Calculus of Vector-valued Functions, Honors

Homework for the week of February 2 – February 6
Due date: Monday, February 16 at the end of your section's lecture

1. Let D^* be the parallelogram

   a) with vertices at $(-2,3)$, $(0,0)$, $(-4,-1)$, and $(-6,2)$;

   b) bounded by the lines $y = x/3$, $y = -x$, $y = (x-8)/3$, and $y = -x+4$.

   Find a (linear) transformation T, such that the image of D^* under T is the rectangle $[0,1] \times [-1,0]$. Show your work. How many such transformations exist?

2. Exercise 8, p.375 from the textbook.

3. Exercise 10, p.375 from the textbook.

4. Exercise 8, p.391 from the textbook.

5. Let $C_1 = \{(x,y,z) | -5 \le x \le 5, -1 \le y \le 1, -\sqrt{1-y^2} \le z \le \sqrt{1-y^2}\}$ and $C_2 = \{(x,y,z) | -1 \le x \le 1, -5 \le y \le 5, -\sqrt{1-x^2} \le z \le \sqrt{1-x^2}\}$ be two cylinders of length 10 and diameter 2 with their axes on the x- and y-axes, respectively. Find the volume of their intersection, $C_1 \cap C_2$.