# CMSI 371
## COMPUTER GRAPHICS
**Spring 2009**

## Assignment 0305

This is a quick turnaround assignment just so you can get your hands dirty with points, vectors, and their related operations before spring break. To sweeten the pot, you also have extra credit options in case you finish the main task quickly.

## Not for Submission

Sections 4.1–4.2 and Appendix B in the Angel book, as well as Appendix E in the red book, round out the material covered in class so far.

## For Submission

Submit hardcopy proofs of the following two assertions (handwritten is fine, LaTeX is better), *using 3D vectors*.

1. The magnitude of a scalar-vector product $\alpha v$ (i.e., $|\alpha v|$), equals the product of the scalar's value and the original vector's magnitude:
$$|\alpha v| = |\alpha||v|$$

2. The vector dot product is distributive over vector addition:
$$u \bullet (v + w) = (u \bullet v) + (u \bullet w)$$

If you do use the LaTeX option for this, commit your LaTeX source to *homework/cmsi371/vectorfun*. However, this directive is simply good practice, and not required for this assignment.

## Extra Credit 1

An incomplete version of the *battleballs* sample program seen in class has been committed to your respective *homework/cmsi371/* directories in CVS. This version does *not* include collision detection code — the assignment is to figure out collision detection between the balls and the inner wall of the spherical "room."

### What to Turn In

Submit the following artifacts:

1. Hardcopy notes (handwritten is fine, LaTeX is better) showing the mathematics behind your collision detection algorithm.

2. The modified *battleballs* code that implements this algorithm.

Submit the notes on hardcopy and commit your modified code to CVS. For full extra credit, you need to turn this in by Thursday, March 5.

## Extra Credit 2

For a *second* extra credit assignment, extend the *battleballs* code further so that the "room" can be a *cube* instead of a sphere, with the corresponding drawing routine and collision detection algorithm/ code. Allow both options to co-exist through an optional command line argument:

*./battleballs*

…should run the program with the original room shape, while:

*./battleballs cube*

…should run the program with the room as a cube. As with the previous extra credit assignment, submit a set of hardcopy notes showing the mathematics, and commit your modified code.