Homework for Week 5
April 28-May 5, 2008

The textbook exercises listed here should be completed before class begins; students will share solutions to these exercises at the beginning of class. You should be prepared to share a solution to any one of these.

Before Class on Tuesday, April 29, read Section 9.1 and work the following exercises:
Section 9.1, # 7, 9, 11, 13, 31

Before Class on Wednesday, April 30, read Section 9.2 (upto page 645) and work the following exercises:
Section 9.2, # 9, 15, 17

Before Class on Thursday, May 1, finish reading Section 9.2 and work the following exercises:
Section 9.2, # 19, 21, 23, 27

Before Class on Monday, May 5, read Section 9.3 (upto page 654) and work the following exercises:
Section 9.3, # 1, 5, 13, 15

Additional Practice Problems

Practice as many of these problems as you can. You may use your solutions as notes during the quiz on Tuesday, May 6.
Section 9.1, # 3, 17, 19, 23, 29
Section 9.2, # 5, 7, 11, 25, 31
Section 9.3, # 3, 7, 21, 23, 29

You really should end the day smarter than when you started it. If you don’t, you’re doing something wrong.

- Warren Buffett

More on back.
Written Homework

Your carefully written solutions to these questions are due at the beginning of class on Monday, May 5.

1. Let $S_1$ be the sphere
   \[ x^2 + (y + 1)^2 + (z - 1)^2 = 4, \]
   and let $S_2$ be the sphere
   \[ x^2 + y^2 - 6y + z^2 - 2z = 6. \]
   
   (a) Find the center and radius of each sphere.
   
   (b) As carefully as you can, graph both spheres on a single set of $xyz$-axes.
   
   (c) The intersection of the two spheres is a circle, and that circle sits in a vertical plane $y = y_0$. Find $y_0$. (Hint: The intersection is the simultaneous solution of these two equations. Try to algebraically solve for $y$ from this system.)
   
   (d) Find the radius of the circle where the two spheres intersect. (Hint: Use your answer to part (c).)

2. Let $\vec{a} = \langle 2, 1, -2 \rangle$, $\vec{b} = \langle 1, 4, 1 \rangle$ and $\vec{c} = \langle 0, 2, 0 \rangle$. Find scalars $r$, $s$ and $t$ such that $r\vec{a} + s\vec{b} + t\vec{c} = \langle 3, 3, 4 \rangle$. (Hint: Start by trying to write the left side as a single vector involving the unknowns $r$, $s$ and $t$. Another Hint: Two vectors are equal if their corresponding components are all equal.)

3. Consider the vector $\vec{v}(t) = \langle 1 - t, t, 8t + 4 \rangle$. This vector depends on the value of $t$, which can be any real number.
   
   (a) What is $\vec{v}(0)$?
   
   (b) What is $|\vec{v}(1)|$?
   
   (c) What value of $t$ will make $|\vec{v}|$ as small as possible?