Homework and Quiz 3

Due Monday, June 29, 2009

Ungraded homework

For practice at home, might I recommend:

> Section 13.3, page 820, problems 3, 7, 11, 15, 17, 23, 35, 37.
> Section 13.4, page 828, problems 3, 5, 7, 11, 13, 19, 33.

The problems on dot products are *extremely* important—you must become very skilled at computing dot products. The problems on cross products are admittedly less important (since it only applies to dimension 3), but they are a lot of fun.

Graded Quiz

(a) Compute the dot product of the vectors $(4, 1, 5)$ and $(-1, 2, -3)$.

(b) Find a vector of unit length pointing in the same direction as the vector $(2, -1, 3)$.

(c) For which $\alpha \in \mathbb{R}$ are the vectors

$$(-6, \alpha, 2) \text{ and } (\alpha, \alpha^2, \alpha)$$

orthogonal?

(d) Find the angle between the two vectors

$$(\cos\theta, \sin\theta) \text{ and } (\sin\theta, \cos\theta).$$

Your answer should involve θ, and not involve any trigonometric functions.

(e) Let v be the cross product of the vectors

$$u = (1, 2, 3) \text{ and } w = (3, 2, 1).$$

Compute v. What is $u \cdot v$? What is $w \cdot v$?

(f) Find a vector which is orthogonal to both

$$(1, t, 2) \text{ and } (t, 2, 3).$$

Your answer will, of course, depend on t. It might be fun to draw a picture of these vectors for different values of t.