Assignment 4 (10/2)

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This homework is due at the beginning of class on Friday 10/6. *You may cite results from class as appropriate. Unless otherwise stated, you must provide a complete explanation for your solutions, not simply an answer. You are encouraged to work together on these problems, but you must write up your solutions independently.*

You are encouraged to think about the problems marked with a (⋆) *if you have time, but you don't need to hand them in.*

Remember that you can always use the result of the previous assignment problems without proof to solve the new assignment problems.

Problem 0⋆

Over the first week we will be covering section $1-5$ from chapter 12. Try to read the corresponding sections from book everyday after class.

Problem ϵ

How many hours did you take to finish assignments $2, 3$, and 4 together?

Problem 1

The quantity $\vec{a} \cdot (\vec{b} \times \vec{c}) = \vec{b} \cdot (\vec{c} \times \vec{a}) = \vec{c} \cdot (\vec{a} \times \vec{b})$ that we discussed in class today, is called the *scalar triple product* of $\vec{a}, \vec{b}$, and $\vec{c}$.

1. ⋆ Using the geometric definition, check that the scalar triple product is zero iff the three vectors are coplanar.

2. ⋆ Check that we can also write the scalar triple product as
$$Det \begin{bmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{bmatrix} = a_1(b_2c_3 - c_2b_3) - a_2(b_1c_3 - c_1b_3) + a_3(b_1c_2 - c_1b_2)$$
which gives us a numerical way of calculating volume of a parallelepiped.

Problem 2

Problems $12.4.(4, 13, 15, 27, 31, 35, 37, 45(a), 47, 53)$.

Problem 3

Problems from chapter 12 review (at the end of the chapter). Problems $(5, 9, 38\star)$.