TEST PREP on 12.1 and 12.2 - Dr. Loveless

Test Prep Format: The format and goals are these...

1. You will start with attempting the first problem on your own for a few minutes.
2. Then you'll compare and discuss with classmates.
3. Then you'll discuss with your TA.
4. After that, you can do more problems from the test prep, or you can switch to homework questions (that is up to you and your classmates). You can use the other problems in the test prep for review (solutions will be posted after class)

Notes:

- This problem comes *directly* from the Dr. Loveless old exam archive. You can find solutions in that archive.
- You should picture yourself encountering these during a test. Could you do them? What surprises or confuses you about the problem? Can you do them efficiently, under time-pressure? Could you check your work and know you are right? These are the questions you should ask yourself as you do each homework question this term.

Since we haven't done much content yet, the problems in this test prep may be hard for you to get started, but they should get the mathematical juices flowing and give you something to chat about with your classmates. Future test preps will contain more interesting key concepts. Hope this is helpful.

Participation Code: It is the radius of the sphere in the question below, entered as a decimal. Enter this in the Canvas Quiz called "Test Prep (1/4)" (the number's 1/4 are the date of the test prep). **The answer is 0.75. Enter that (as a decimal)!** In the future, I will not tell you the code, your TA will and you have to be in attendance to get it.

Fall 2013 - Exam 1 - Dr. Loveless (attempt this on a separate piece of paper)
(*this was half of a page on this exam, a good goal is to try to complete it in under 6 minutes*).

1(b). (5 pts) Find the center and radius of the sphere with points $P(x, y, z)$ such that distance from P to $A(0, 0, 2)$ is triple the distance from P to $B(0, 0, 0)$.

Note/Hint: The goal is to directly translate the statement using the distance formula, then manipulate the corresponding equation to get the standard form for a sphere. This problem is very similar to the 12.1 HW problem 15 which students often struggle with so this should help you with homework. The numbers in the homework problem are much messier and in that problem you must use exact fractions, no decimals, which make it a real algebra/arithmetic challenge (the hardest problem of the first two weeks, I think), but hopefully this test prep gives you the idea of how to approach it.

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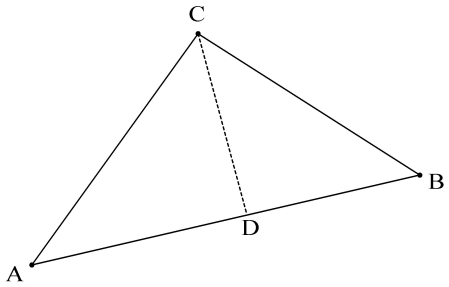
Don't work this problem now. This problem is a preview of some of the skills you will build up in chapter 12. Come back to this in a week, hopefully you know how to do these problems by then.
Part (a) requires 12.5 (planes) which we will do at the end of next week.
Part (b) can be done with 12.4 (cross-products).
Part (c) requires 12.2 (basic vectors skills).
Part (d) can be done with 12.3 (dot products).

2. (14 pts) Consider the triangle shown. The coordinates for C are (4,3,1).
   You are given $\overrightarrow{BA} = \langle -2, -1, 3 \rangle$ and $\overrightarrow{BC} = \langle -1, 1, 4 \rangle$.
   The dotted line CD is perpendicular to BA.
   Answer the following questions (Leave your answer in exact form, you do not have to simplify).

   (a) (5 pts) Find the equation of the plane that contains the points A, B, and C.



   (b) (3 pts) Find the area of the triangle ABC.

   (c) (3 pts) Find the coordinates for the point A.

   (d) (3 pts) Find the distance from B to D.