Math 251 Quiz # 2 review sheet

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Here is a review sheet for your 2nd quiz coming up on Wednesday! It will not be cumulative, and neither will the next exam, although the final WILL be cumulative. ROCK ON!

1. Section 1.3: Matrices, Determinants and the Cross Product. This section is an introduction to, well, what it advertises. An understanding of matrices and determinants is and will be essential. In this section, they are used to define the *cross product* of two vectors in $\mathbb{R}^3$ to form a new vector that is perpendicular to the other two. There are various properties of the cross product (see page 46), there is a formula for the area of a parallellogram spanned by two vectors, and the volume of a parallellopiped spanned by 3 vectors. All of this is likely to be of use. We also discussed planes and their equations, and the (shortest) distance from a point to a plane. All of these homework questions are good practice problems.

2. Section 1.4: Cylindrical and Spherical Coordinates. In this section we learn about cylindrical and spherical coordinates and how to change between these two and our familiar rectangular coordinates. Being familiar with this process (especially translating TO rectangular coordinates from these) is good to know.

3. Section 1.5: n-Dimensional Euclidean Space. This section is devoted to understanding which of the properties that we have studied in $\mathbb{R}^3$ carry over to the general Euclidean space $\mathbb{R}^n$. Pretty much everything does, with exception to the cross product, which we understand is only a 3-dimensional phenomenon. We also discussed matrices of more general size, and reminded ourselves how to compute determinants

of these matrices, multiply them (of the same or corresponding size), and add them. Of course, we saw that in general addition is commutative ($A + B = B + A$), but that multiplication of matrices need not be ($AB \neq BA$ all the time!)

4. Section 2.1: The Geometry of Real Valued Functions. In this section we learned how to envision certain sorts of graphs by studying *level sets*. It is a good idea to know how to sketch graphs of basic functions of two variables, and that in the event you really don't know what it looks like, you should be able to reconstruct a reasonably close picture of the graph based on your level sets.

5. Section 2.2: Limits and Continuity. In this section we understand what the limit of a multivariable function is, and what continuity means in this new context. We are given several properties of limits to help us determine a limit should it exist, and we also learned a new method for showing that a limit does not exist: prove that the limit must be two different values by approaching the point in two different ways. The class notes provide lots of examples of this, and the homework also provides an excellent set of practice problems.

6. General suggestions: ROCK ON!