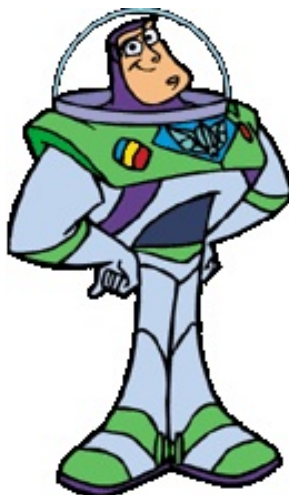


# Math 331 Quiz #3 Review Sheet!

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*Hello there, Junior Star Rangers! Buzz Lightyear here to share with you the secrets of Corey's Quiz #3. He can be a tricky guy, but I'm here to help you focus your attention on Linear Algebra. ROCK ON!*

1. Sections 5.1 and 5.2: Inner Products on Vector Spaces. The notion of an inner product on a vector space is very, very important. We are all familiar from our multivariable calculus days the notion of the dot product on  $\mathbb{R}^n$ . We are also familiar with its properties: linearity, being symmetric, etc. (see page 276) In fact, it is the dot product that is tied to the notion of the “length” of a vector. What we, as explorers of the galaxy, I mean, as mathematicians would like is a way to expand the notion of length and dot products to more arbitrary vector spaces. So, we define an *inner product* to be an object that satisfies the properties listed on page 285. It has similar properties to the dot product, see page 288. I would know the defining properties of inner products, and be able to tell if something is an inner product, or why it fails to be one. See homework problems 21–24 from section 5.2. Another big idea is the notion of projection of one vector onto another. Be ready to answer questions about this, see questions 41–44 for examples of this.

2. Section 5.3: Orthonormal Bases and the Gram-Schmidt Process. Given a vector space with an inner product, you can find special bases that are called *orthonormal*. It is most important to know what this is, and how to check if a given basis is orthonormal with respect to a given inner product. Keep in mind that if you give me a basis, it could be orthonormal with respect to one inner product, but not orthonormal (or even orthogonal) with respect to another. Another important process was that of the Gram Schmidt process of taking a basis and changing it into an orthonormal basis. It rules. See the class notes, and homework questions 19–21 with regard to the Gram-Schmidt material.
3. **ROCK ON.**