Review for Third Exam

The third exam will cover Sections 4.1, 4.3, 4.4, 5.1, and 5.2 of the text.

4.1 This is review material from Calculus III. You can skip the subsection on "Resultant Force and Velocity".

4.3 You should read from the beginning of the section through the second remark on the top of page 236, and Examples 3 and 5. You can skip Examples 2, 4, and 6. You can also skip Theorem 4.2 and the material on pages 238 and 239. However, you should be able to do a problem like the following: show that

$$(\mathbf{v}, \mathbf{w}) = \mathbf{v}^T \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix} \mathbf{w}$$

defines an inner product on R^2 (cf. example 7). We did a similar example in class using the matrix $\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ in place of $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$.

You should read the rest of the section from Definition 4.2 all the way to the end of the section, except you can skip Examples 9, 11, and 14. You can also skip the proof of Theorem 4.3 if you like. I gave a different proof in class, and in any case I won't ask for a proof of this theorem on the test. You should know the statement of the theorem, though.

Although I did not prove Corollary 4.1 or Theorem 4.4 in class, I do recommend reading their proofs, which are simple and instructive.

4.4 Read from the beginning of the section through the end of Example 2. Rather than memorizing the formulas for $\mathbf{v}_2$ and $\mathbf{v}_3$ that you see on page 249, it's easier just to remember that

$$\mathbf{v}_2 = \mathbf{u}_2 + a\mathbf{v}_1,$$
$$\mathbf{v}_3 = \mathbf{u}_3 + b\mathbf{v}_2 + c\mathbf{v}_1,$$

and so on, and solve for a, b, and c by using the equations $(\mathbf{v}_2, \mathbf{v}_1) = 0$, $(\mathbf{v}_3, \mathbf{v}_2) = 0$, $(\mathbf{v}_3, \mathbf{v}_1) = 0$, etc.

5.1 Read the whole section, except you can skip Example 11. Definition 5.1, Example 2, Theorem 5.3, and Example 10 are basic.

5.2 Read from the beginning of the section through Example 9, except you can skip Examples 4 and 6, and the proof of Theorem 5.6.

(The lucky students in the 1:30 section got to see the proof of Theorem 5.4(b) in class, but the students in the 10:30 section can still have the pleasure of reading it on their own from the text.)

You can skip the material in the section which comes after Example 9. I won't ask about inverses of linear transformations on this exam.