Study guide

- (§3.4) Know the definition of "coordinates of $\vec{v}$ in basis B", and the shorthand notation $[\vec{v}]_B$.
- (§3.4) If S is the standard basis for $\mathbb{R}^n$, then for all $\vec{v} \in \mathbb{R}^n$, $[\vec{v}]_S = \vec{v}$ (the coordinate vector is the same as the vector itself). Make sure you understand why!
- (§3.4) If you are given a vector $\vec{v}$ and a basis B, how do you compute the coordinates $[\vec{v}]_B$?
- (§3.4) Know the definition of the *change of basis matrix* (also called *transition matrices*) $[I]_B^{B'}$ and how to compute them. Know the basic facts about inverses and products of change of basis matrices

Terminology note: the textbook says "ordered basis" where we've usually just said "basis." Also, the phrase "transition matrix" means the same as "change of basis matrix."

1. (Textbook §3.4, exercises 1–8: find the coordinates of a given vector in terms of a given basis.) You can check the odd-numbered problems in the back of the book.

2. (Textbook §3.4, exercises 13-18: find the transition matrix from one given basis to another.) You can check the odd-numbered problems in the back of the book.

3. (Textbook 3.4.22)
Let

$$B_1 = \left\{ \begin{bmatrix} 2 \\ 2 \end{bmatrix}, \begin{bmatrix} 1 \\ -2 \end{bmatrix} \right\}$$

and

$$B_2 = \left\{ \begin{bmatrix} -1 \\ 2 \end{bmatrix}, \begin{bmatrix} 3 \\ 0 \end{bmatrix} \right\}$$

be two ordered bases for $\mathbb{R}^2$.

(a) Find $[I]_{B_1}^{B_2}$

(b) Find $[I]_{B_2}^{B_1}$

(c) Show that $\left([I]_{B_1}^{B_2}\right)^{-1} = [I]_{B_2}^{B_1}$

Additional problems to be posted later, after the second midterm. This assignment will not be due until the Friday after April break.