Hw 1

Math 321

Without specific declaration, the scalar set is always $\mathbb{R}$, i.e. the set of all real numbers. The problems with $*$ are for the ones who like math.

1 Exercises in 1.1

#3 #4

2 Exercises in 1.2

#3 (Actually, for a very special vector $\vec{b}$, this would be a vector space). #6 #7 #10(Note here we pick scalars from $\mathbb{R}$)

3 Exercises in 1.3

#1, #2, #6 #9

4 Extra exercises

1. What are the dimensions of the following two vector spaces? Why?
   a). $V = \{(0,0)\}$ as a subspace of $\mathbb{R}^2$.
   b). $V = \{\alpha\vec{a} + \beta\vec{b}, \vec{a} = (1,2), \vec{b} = (2,4)\}$.

2. (*)If the scalars are picked from $\mathbb{C}$ instead of $\mathbb{R}$, what's the dimension of $\mathbb{C}^n$?

3. (*)For fun. Consider the set of solutions to the differential equation
   $y'' - 2y' - 8y = 0$. Is this set a vector space? What's the dimension? Find a basis for it. Find the component of the solution satisfying $y(0) = 0, y'(0) = 1$ with respect to the basis you choose.
   If the equation is $y'' - 2y' - 8y = 1$, answer the questions once again.

4. (*)Think about #11 in exercises 1.2.