

## HOMWORK 4 - DUE OCTOBER 8

**Homework instructions:** Complete the assigned problems on your own paper. Once you are finished, scan or photograph your work and upload it to Gradescope. When prompted, tell Gradescope where to find each problem.

You are allowed (and in fact encouraged) to work with other students on homework assignments. If you do that, please indicate on each problem who you worked with. If you use sources other than your notes, the textbook, and any resources on Canvas for your homework, you must indicate the source on each problem. You are not permitted to view, request, or look for solutions to any of the homework problems from solutions manuals, homework help websites, online forums, other students, or any other sources.

### Textbook Problems:

- §4.3: 9, 17, 18
- §4.4: 6, 16, 20
- §4.5: 5, 7, 15

### Additional Problems:

1. Let  $\vec{v}_1$  and  $\vec{v}_2$  be any linearly independent vectors. Show that  $\vec{u}_1 = 2\vec{v}_1$  and  $\vec{u}_2 = \vec{v}_1 + \vec{v}_2$  are also linearly independent.
2. In section 4.2, we looked at the set  $W$  consisting of all vectors in  $\mathbb{R}^3$  where  $x_1 = 5x_2$  and determined it was a subspace of  $\mathbb{R}^3$ . Find a basis for  $W$ . What is the dimension of  $W$ ?
3. Let  $S = \{\vec{v}_1, \vec{v}_2, \vec{v}_3\}$  be a set of linearly independent vectors and suppose that  $\vec{v}$  is not an element of  $\text{span } S$ . Show that  $S' = \{\vec{v}, \vec{v}_1, \vec{v}_2, \vec{v}_3\}$  is linearly independent.