

Special homework rules:

- There will be no partial credit for this homework. Each problem will be graded out of 5 points, and only a perfect solution will earn 5 points, any other will earn 0.
- You can turn in this homework as often as you would like this semester, until you get a score that you are happy with. The last opportunity to submit this homework is on December 9, **in class**.
- Every submission must be complete (i.e. contain solutions to both problems, and each solution must be perfect to earn points). You may turn in the same work again, provided everything is stapled together.
- One or both of these questions will be on the final exam.

1. Let

$$\vec{v} = \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}.$$

Prove that the set of all vectors in \mathbb{R}^3 that are orthogonal to \vec{v} is a vector space.

2. Consider the set of all functions f such that

$$f'' + f = 0,$$

where f'' is the second derivative of f . Prove that this set is a vector space **by showing that all 10 axioms defining a vector space** are satisfied (i.e. you may not use the vector subspace property).