

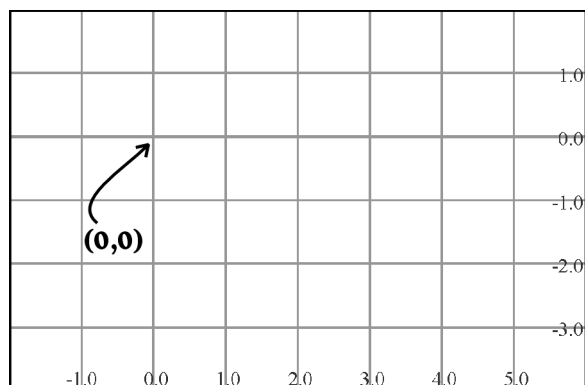
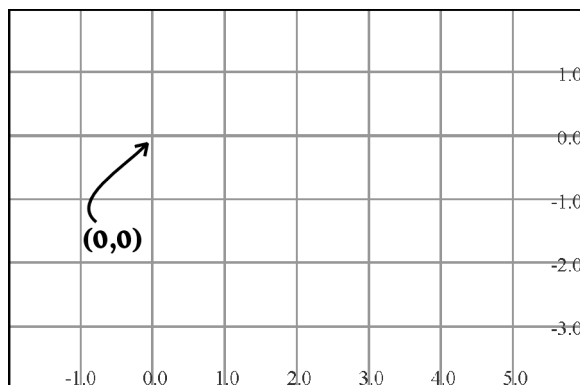
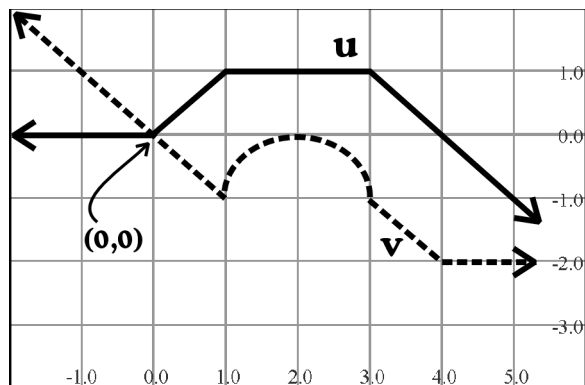
1. Suppose V is a vector space and H is a subset of V . What are the three properties that H must satisfy in order to be a subspace of V ? (List in the same order as we have in class)

(1)

(2)

(3)

2. As in class, let \mathbf{F} be the vector space whose members are functions $f : \mathbf{R} \rightarrow \mathbf{R}$ which are continuous. The figure below shows the graphs of two vectors \mathbf{u} and \mathbf{v} in \mathbf{F} . On the empty grid to the right, show the graph of $-2\mathbf{v}$. On the bottom grid, show the linear combination $\mathbf{u} + \mathbf{v}$. (Draw both answers with solid lines)



3. Let H be the subset of all vectors in \mathbf{F} whose graph is horizontal from $x = 1$ to $x = 3$.

3a. Is either of \mathbf{u} or \mathbf{v} from problem (2) in H ? Explain both decisions.

3b. For each of the 3 properties in problem (1), decide if the property holds for H or does not. If it holds, explain why; if it does not, then give a counterexample (in pictures if you wish).

(1)

(2)

(3)

4. Let \mathcal{S} be the “script-S” vector space of all infinite sequences of real numbers we’ve discussed in class. Let H be the subset of \mathcal{S} consisting of all sequences which change sign from term-to-term, that is, if \mathbf{s} is a sequence in H , and some term of \mathbf{s} is positive, the one after it is negative, and vice-versa. *By default*, we will also automatically add the sequence $\mathbf{0} = (0, 0, 0, \dots)$ to H .

4a. Is $\mathbf{s}_1 = (1, -2, 3, -4, 5, -6, \dots)$ in H ?

4b. Is $\mathbf{s}_2 = (3, 0, -3.1, 0, 3.14, 0, -3.141, \dots)$ in H ?

For each of the 3 properties in problem (1), decide if the property holds for H or does not. If it holds, explain why; if it does not, then give a counterexample using specific sequences.

(1)

(2)

(3)