Last name _____

First name _____

LARSON—MATH 310–HOMEWORK WORKSHEET 10
Linear Dependence.

General Instructions

1. Write up a **neat** assignment on a **new sheet** of paper. (Do not cram your answers between the lines).
2. **Number** your problems so that it is easy to see what work matches the assigned problems.
3. Remember to **give examples** (you do not understand a concept unless you can provide an example of it).

Problems

1. Define what it means for a collection of vectors to be **linearly dependent**, and give an example. Explain.
2. Define what it means for a collection of vectors to be **linearly independent**, and give an example. Explain.
3. From our text:

   Problem 5.14.1: Let $\mathcal{V} = \text{Span}\,\{[2,0,4,0],[0,1,0,1],[0,0,-1,-1]\}$. For each of the following vectors, show it belongs to $\mathcal{V}$ by writing it as a linear combination of the generators of $\mathcal{V}$.

   [2, 1, 4, 1]

4. From our text:

   Problem 5.14.5: For each of the parts below, show the given vectors over $\mathbb{R}$ are linearly dependent by writing the zero vector as a nontrivial linear combination of the vectors.

   (a) $[1,2,0],[2,4,1],[0,0,-1]$

   (b) $[2,4,0],[8,16,4],[0,0,7]$

   (c) $[0,0,5],[1,34,2],[123,456,789],[-3,-6,0],[1,2,0.5]$

5. From our text:

   Problem 5.14.7: Show that one of the vectors is superfluous by expressing it as a linear combination of the other two.

   $$\begin{aligned} \boldsymbol{u} &= [3,9,6,5,5] \\ \boldsymbol{v} &= [4,10,6,6,8] \\ \boldsymbol{w} &= [1,1,0,1,3] \end{aligned}$$