More HW for next Friday Oct 14!

- Chapter 4: Review problems
  - True/False: if true, prove; if false, find counterexample.
  - All multiples of 4, i.e. 4, 8, ..., 64.

- More HW for next Friday Oct 14!

- Chapter 4: Review problems
  - True/False: if true, prove; if false, find counterexample.
  - All multiples of 4, i.e. 4, 8, ..., 64.

- More HW for next Friday Oct 14!

- Chapter 4: Review problems
  - True/False: if true, prove; if false, find counterexample.
  - All multiples of 4, i.e. 4, 8, ..., 64.

- More HW for next Friday Oct 14!

- Chapter 4: Review problems
  - True/False: if true, prove; if false, find counterexample.
  - All multiples of 4, i.e. 4, 8, ..., 64.

- More HW for next Friday Oct 14!

- Chapter 4: Review problems
  - True/False: if true, prove; if false, find counterexample.
  - All multiples of 4, i.e. 4, 8, ..., 64.

- More HW for next Friday Oct 14!

- Chapter 4: Review problems
  - True/False: if true, prove; if false, find counterexample.
  - All multiples of 4, i.e. 4, 8, ..., 64.

- More HW for next Friday Oct 14!

- Chapter 4: Review problems
  - True/False: if true, prove; if false, find counterexample.
  - All multiples of 4, i.e. 4, 8, ..., 64.

- More HW for next Friday Oct 14!

- Chapter 4: Review problems
  - True/False: if true, prove; if false, find counterexample.
  - All multiples of 4, i.e. 4, 8, ..., 64.

- More HW for next Friday Oct 14!

- Chapter 4: Review problems
  - True/False: if true, prove; if false, find counterexample.
  - All multiples of 4, i.e. 4, 8, ..., 64.

- More HW for next Friday Oct 14!

- Chapter 4: Review problems
  - True/False: if true, prove; if false, find counterexample.
  - All multiples of 4, i.e. 4, 8, ..., 64.

- More HW for next Friday Oct 14!

- Chapter 4: Review problems
  - True/False: if true, prove; if false, find counterexample.
  - All multiples of 4, i.e. 4, 8, ..., 64.

- More HW for next Friday Oct 14!

- Chapter 4: Review problems
  - True/False: if true, prove; if false, find counterexample.
  - All multiples of 4, i.e. 4, 8, ..., 64.
Matrix of a linear transformation

First note, compositions of linear transformations are linear:

Let \( L : V \rightarrow W \) linear,
\( T : W \rightarrow Z \) linear.

Then \( T \circ L : V \rightarrow Z \)
\((T \circ L)(v) = T(L(v))\) is linear.

- check:

This diagram explains the matrix \( A \) of a linear transformation \( L : V \rightarrow V \)
with respect to a basis \( \mathcal{B} = \{e_1, e_2, \ldots, e_n\} \) for \( V \):

\[
\begin{array}{ccc}
\mathbb{C}^{n} & \xrightarrow{L} & \mathbb{C}^{n} \\
\downarrow \quad [v]_{\mathcal{B}} & & \quad \downarrow \quad [L(v)]_{\mathcal{B}} \\
\mathbb{R}^{n} & \xrightarrow{A} & \mathbb{R}^{n}
\end{array}
\]

\( A [v]_{\mathcal{B}} = [L(v)]_{\mathcal{B}} \)

In particular,
\[
\text{col}_j(A) = A e_j = A [e_j]_{\mathcal{B}} = [L e_j]_{\mathcal{B}} \]

"the \( j \)th column of \( A \) is the \( j \)th standard vector of \( L e_j \)"
Example (first of many).

Let \( L : P_2 \to P_2 \) be defined by \( L(f) = f' \).

Let \( B = \{1, x, x^2\} \).

- Find \( A = [L]_B \) column by column directly.
- How are \( \ker(L) \), \( \text{im}(L) \) related to \( A \)?

Page 3 Tuesday example continued.