

All problems are to be written up clearly and thoroughly, using complete sentences. This assignment is due in discussion at 2pm on Tuesday, January 14th.

For all T/F problems on the homework, provide a brief justification for your answer. That may be citing an appropriate theorem or providing a counterexample.

1. From the book:

Section 1.3 problem 31.

Section 1.6 problem 35.

Section 2.1 problem 42.

Section 2.6 problems 1, 7, 13, 14, 17, 20.

2. Let  $V$  be the vector space of sequences of real numbers so that

$$V = \{(a_0, a_1, a_2, a_3, \dots) \mid a_i \in \mathbb{R}\},$$

and let  $W \subseteq V$  be the subspace

$$W = \{(0, a_1, a_2, a_3, \dots) \mid a_i \in \mathbb{R}\}.$$

- (a) Show that although the inclusion of  $W$  into  $V$  is an injective map, it is not an isomorphism.
- (b) Show that despite this  $W \cong V$ . (*Hint*: you will need to define another map.)