

Solve the following problems. This assignment will not be collected.

1. Section 6.4 problems 1, 2 a, c, d, f, 4, 6, 7, 9, 11, 12, 14, 17, 20

A linear operator  $T : V \rightarrow V$  such that  $\|T(v)\| = \|v\|$  for all  $v \in V$  is called a *unitary operator* if  $\mathbb{F} = \mathbb{C}$  and an *orthogonal operator* if  $\mathbb{F} = \mathbb{R}$ .

2. Let  $V$  be a finite-dimensional inner product space over  $\mathbb{F} = \mathbb{C}$ . Show that the following are equivalent.
  - (a)  $T$  is a unitary
  - (b)  $TT^* = T^*T = I$ .
  - (c)  $T$  is an isometry.