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 $T : V \to V$ 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.