Linear Algebra Lesson 27

Part I Vector Subspace

Part II Null Space

Part III Span

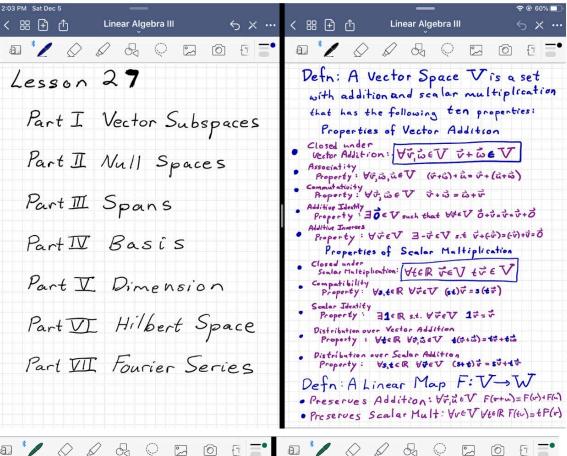
Part IV Basis

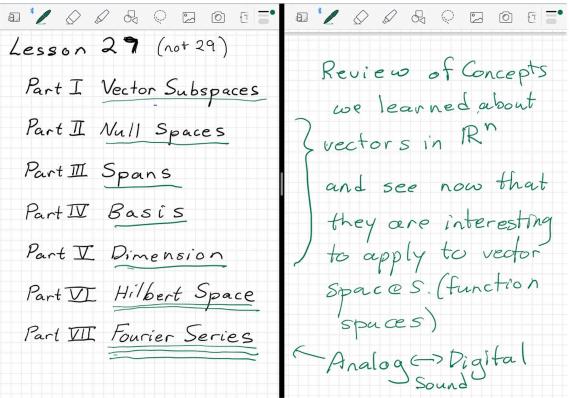
Part V Dimension

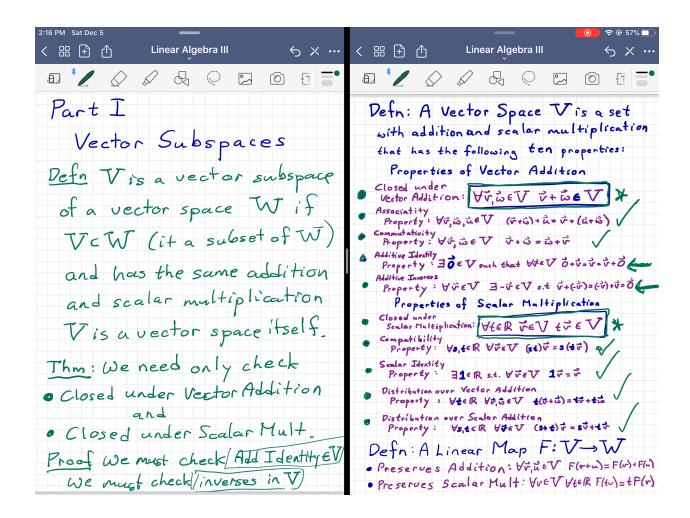
Part VI Hilbert Space: Infinite Dimensional Space

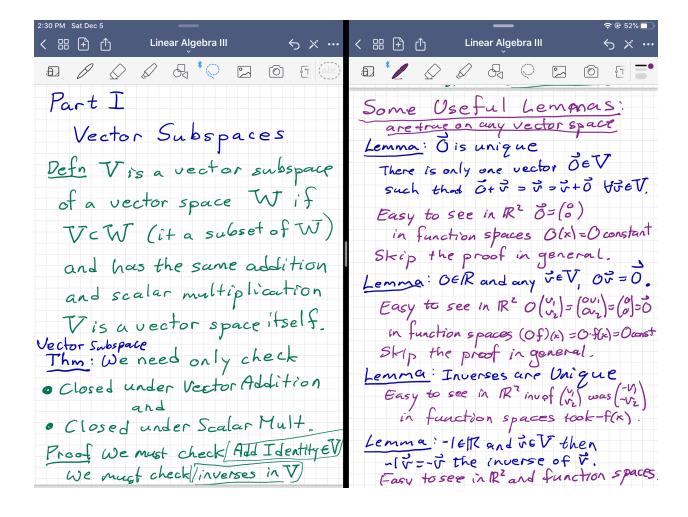
Part VII Fourier Series: Analog to Digital

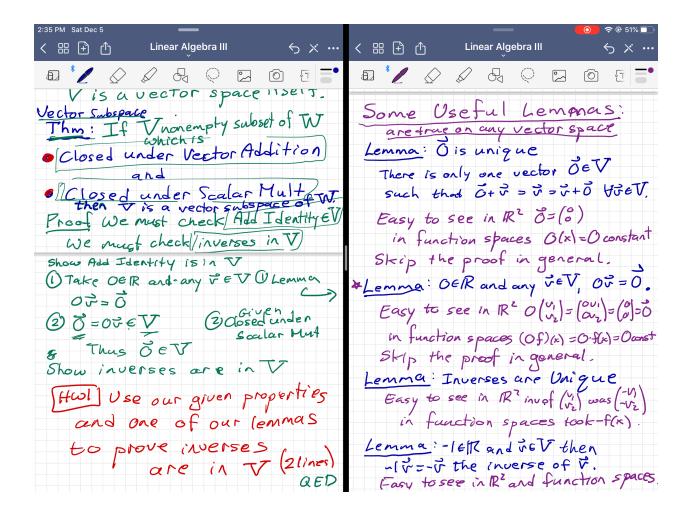
Parts I-V are required as they review theorems and definitions we learned before for the final and analyze how they work on vector spaces in general. We have a different playlist for each of the parts. Parts VI and VII are important for math majors, physics majors, and engineers as they concern Hilbert Space and Fourier Series and the conversion of analog to digital sound.











(more neatly:

Vector Subspace Thm:

If Vis a nonempty subset of W
which is

*Closed Under Addition

*Closed Under Scalar Mult.
then Vis a vector subspace of W

Proof: Must check all properties
of a vector space hold.

*Closed Under vector addition (given)

*Closed Under vector addition (given)

*Closed Under scalar mult (given)

Check off 6 properties

using that they are true
for vectors in W and all

vectors in V are in W /////

Additive In Property (proced using)

Additive Inverses Prop (HWI also gard)

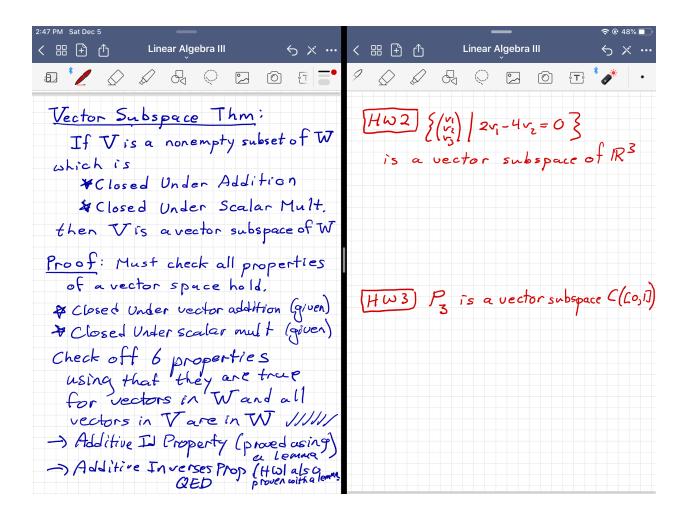
Additive Inverses Prop (HWI also gard)

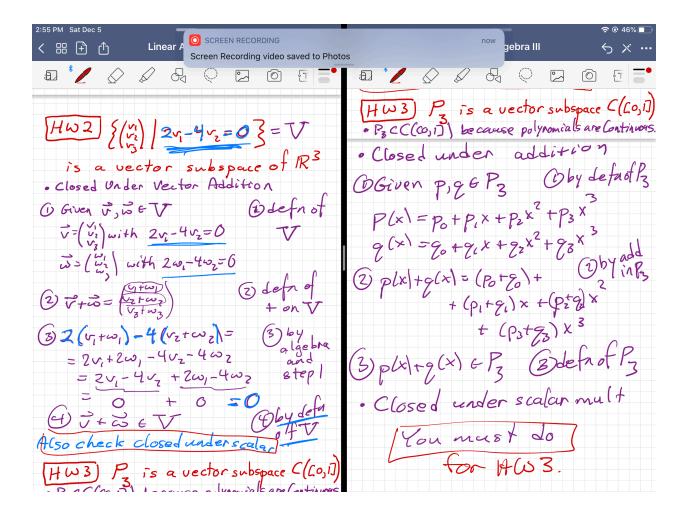
Defn: A Vector Space Vis a set with addition and scalar multiplication that has the following ten properties: Properties of Vector Addition Closed under VribeV v+ & V Associatity
Property: VV, is, is V (V+i)+i=V+(i+i) V ommutativity Roperty: ∀ボ, む∈ V マ+ガ=む+デ Additive Identity

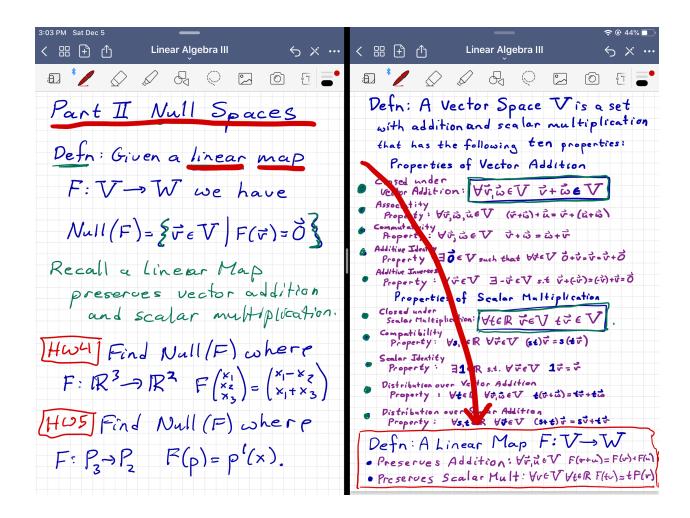
Property: 30 EV such that brieV 0+v=v=v+0

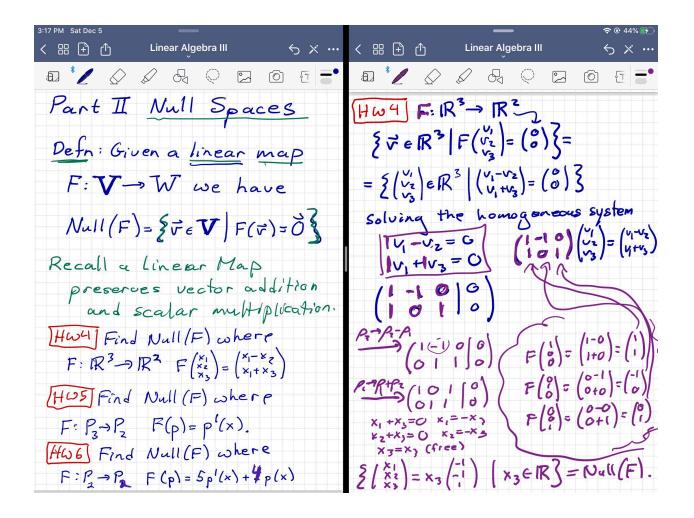
Additive Inverses Property : ∀veV 3-veV s.t v+(v)=(v)+v=0€ Properties of Scalar Multiplication Scalar Multiplication: VER VEV to EV Property: Vs. te R VreV (st) v = s(tv) Scalar Identity
Property 31eR s.t. VVeV 1v=v Distribution over Vector Addition Property: VteR Vt, & eV t(+ i) = +++i Property: Vs. teR HoteV (s+t) = sv+tv

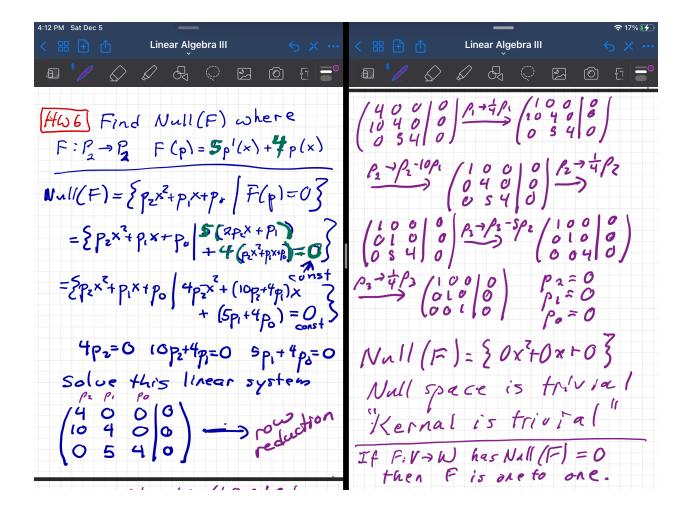
QED

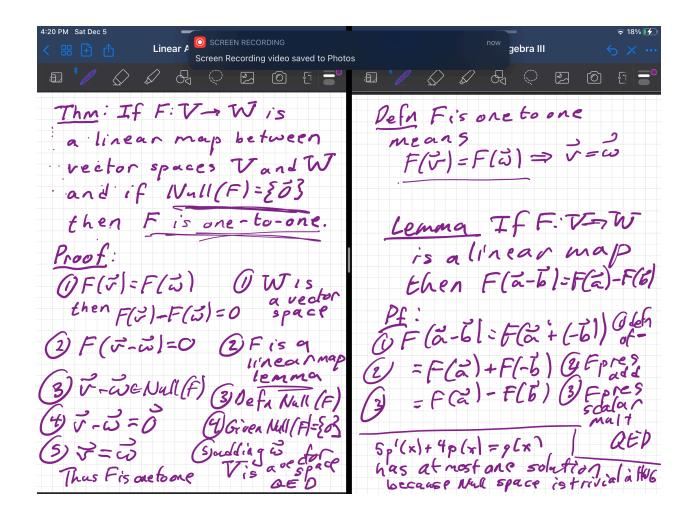


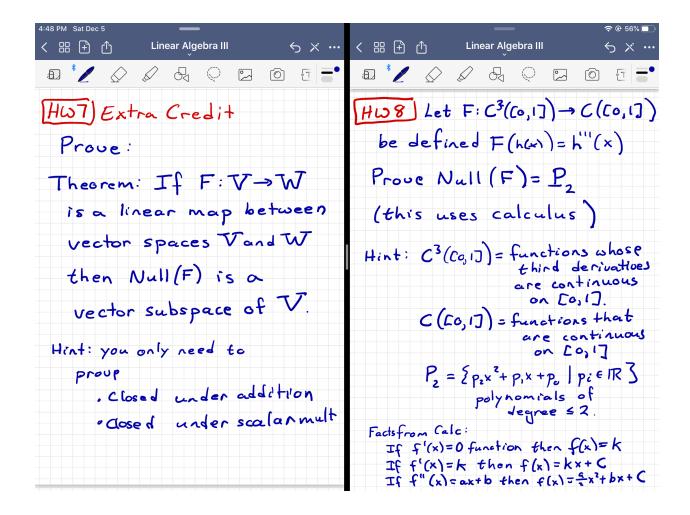


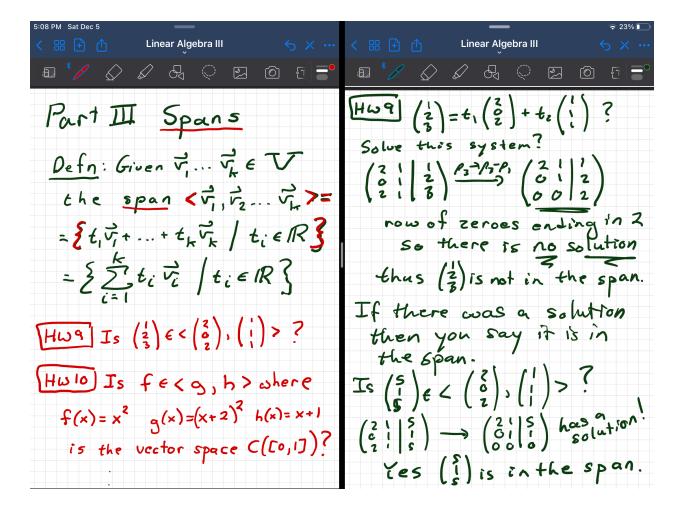


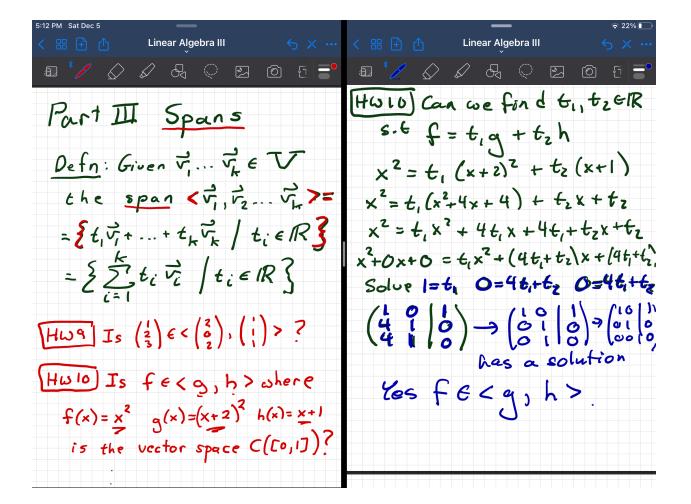


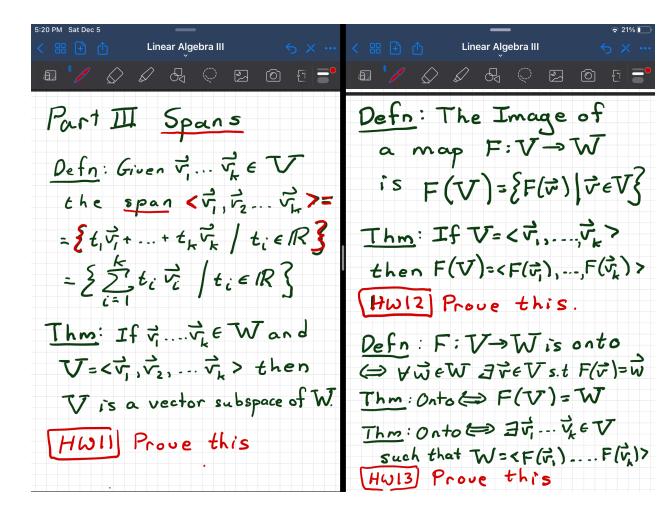


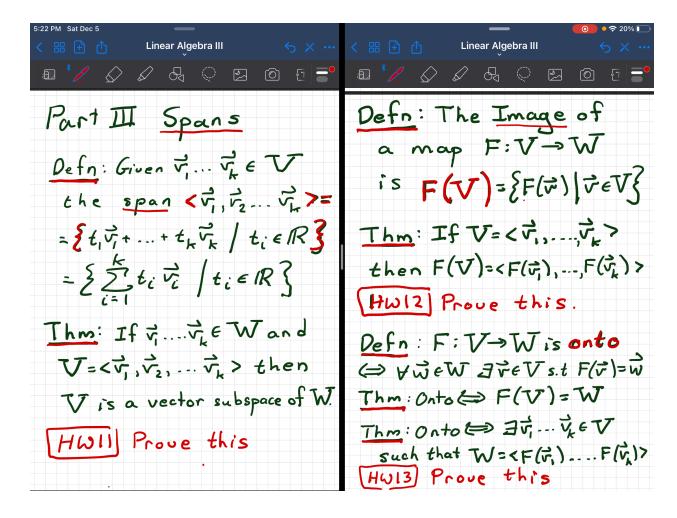


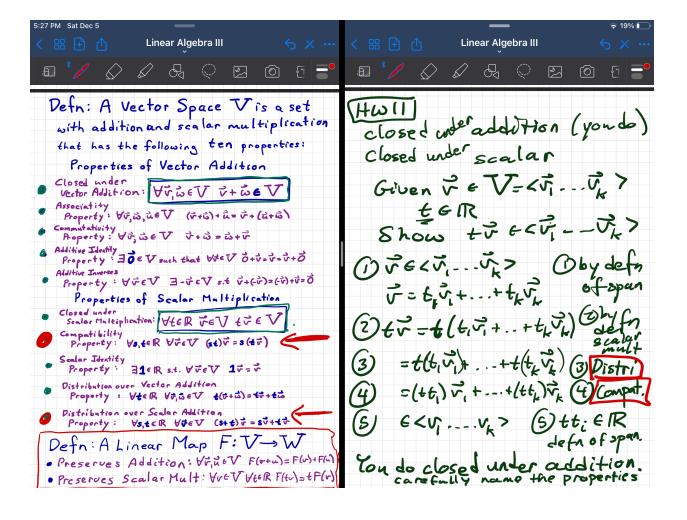


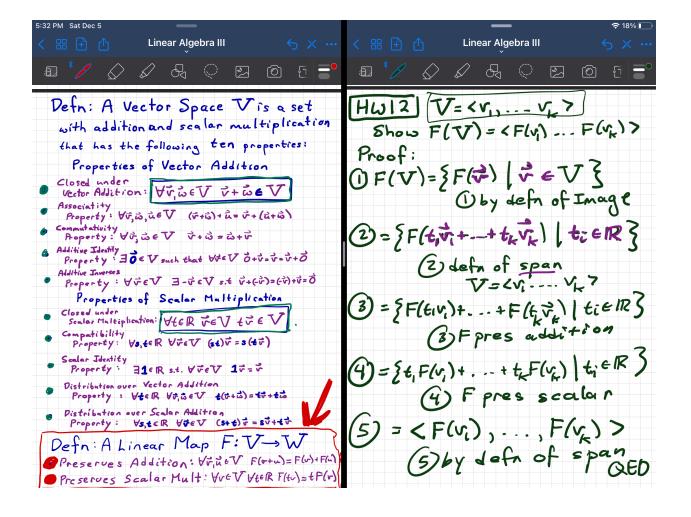


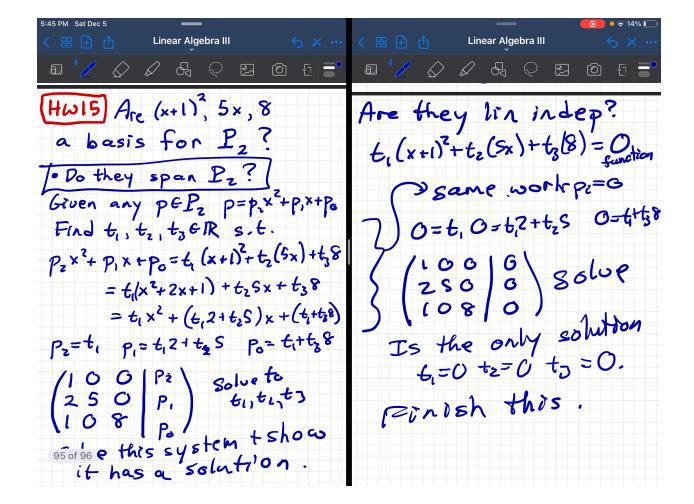


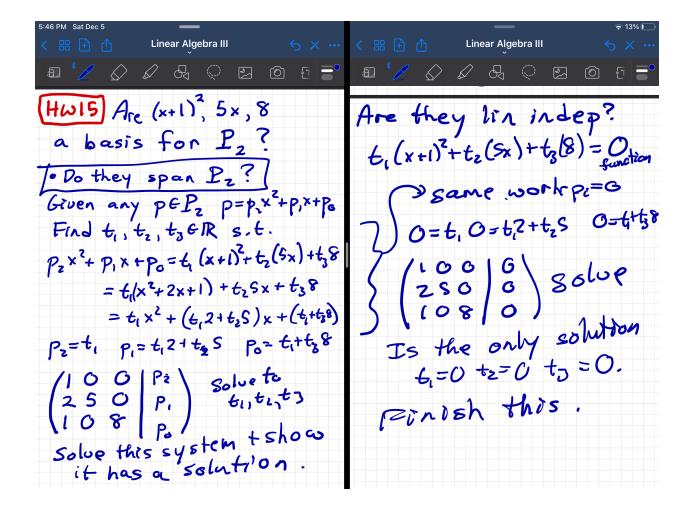




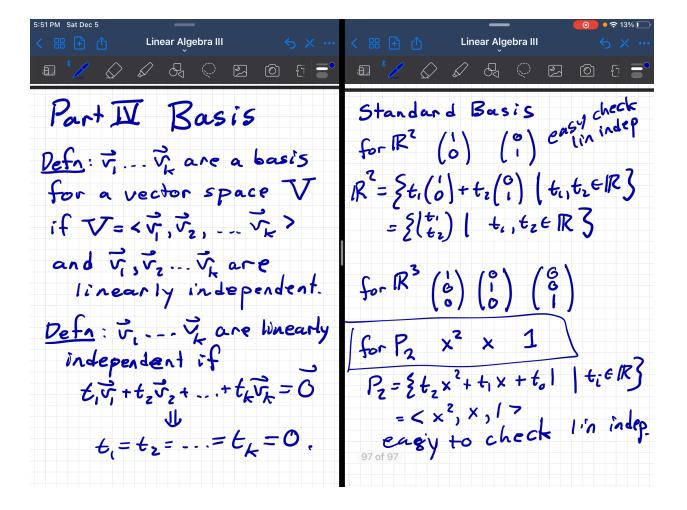


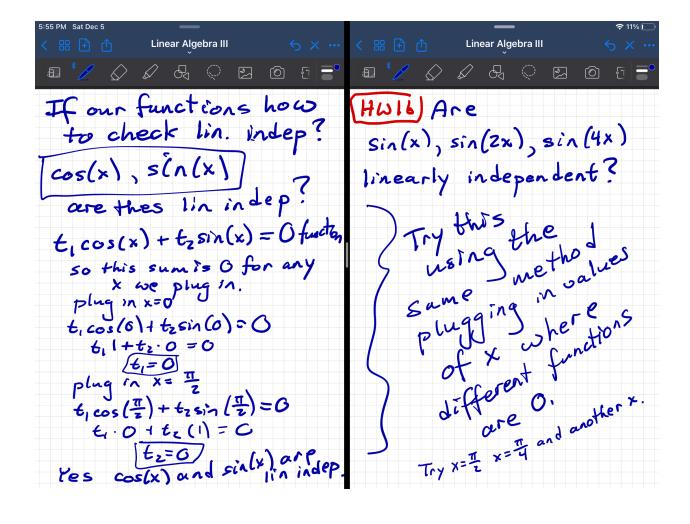


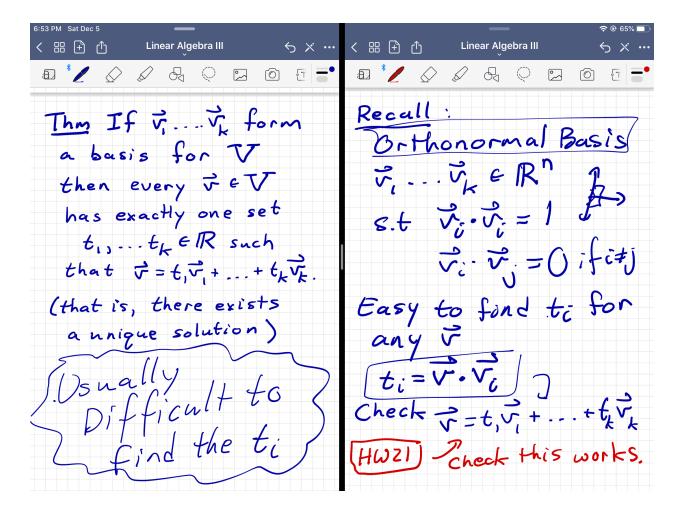




Part IV Basis

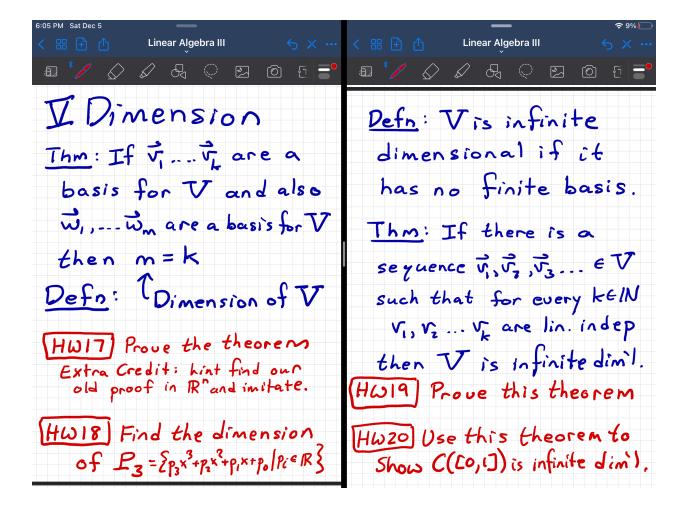


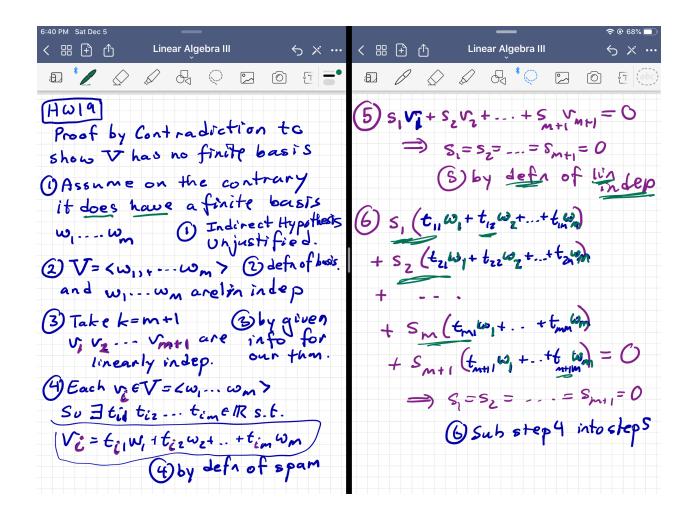


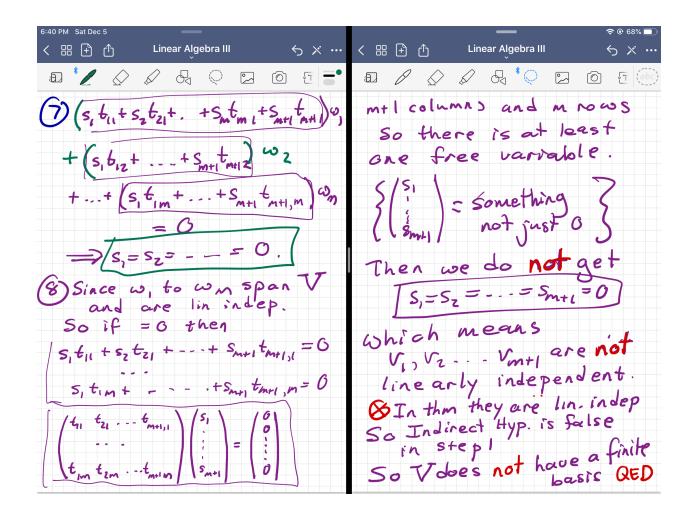


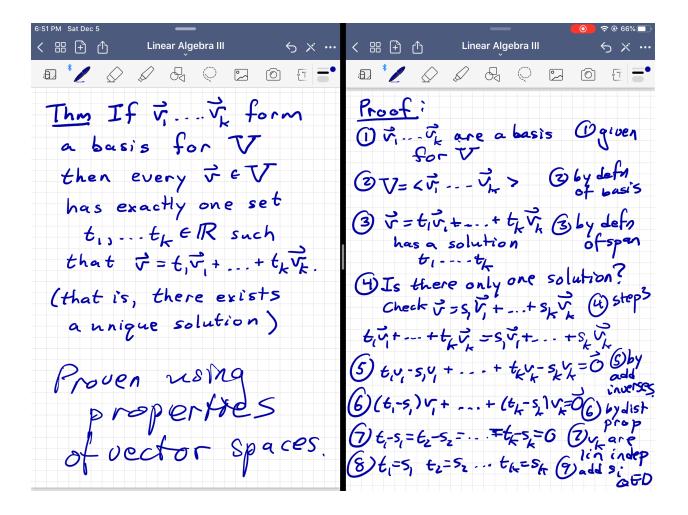
We will do HW17-20 in Part 5.

Part V Dimension

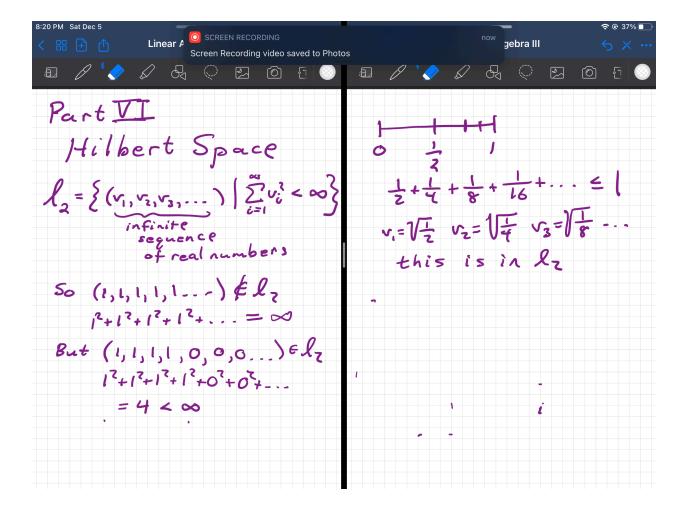


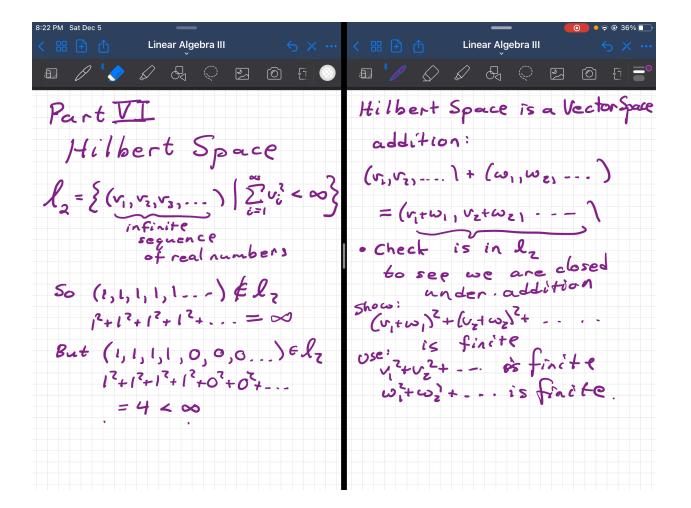


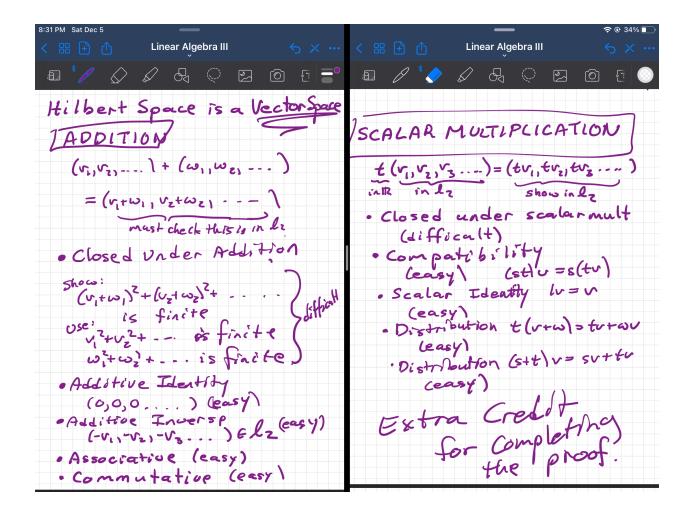




Part VI Hilbert Space

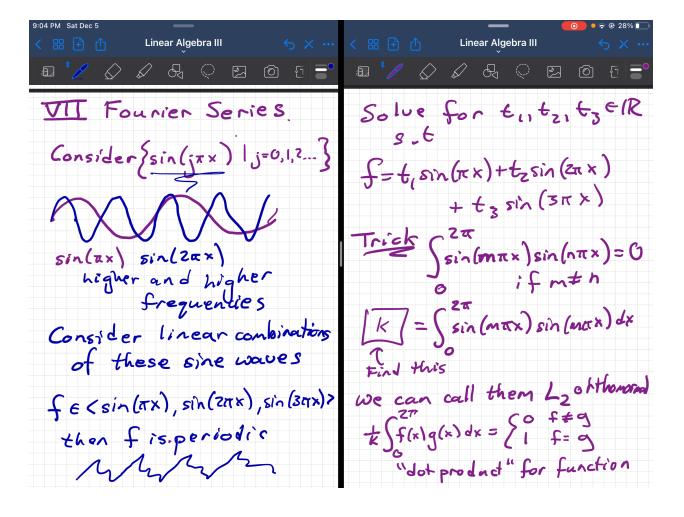


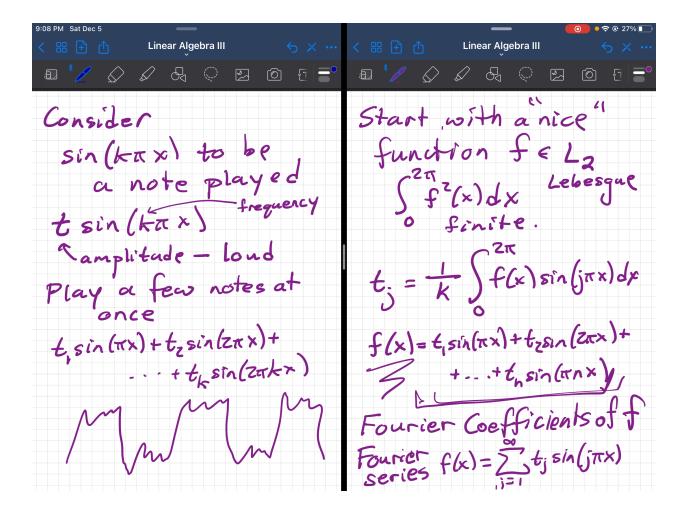


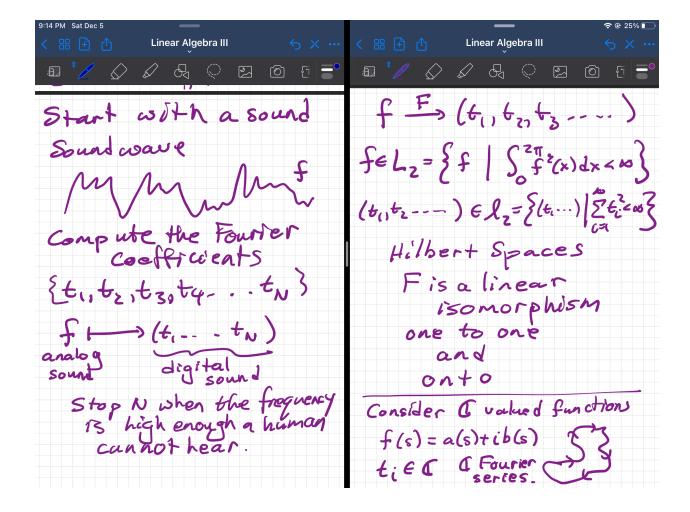


Part VII Fourier Series Analog to Digital

Watch <u>Playlist 313F20-27-Part7</u> which has one video made by me and then a few others with professional sound and graphics.







Direct links to the professional videos:

Sounds https://youtu.be/3IAMpH4xF9Q

saw wave https://youtu.be/YUBe-ro8914

3blue1brown https://youtu.be/r6sGWTCMz2k