#	Question	Answer(s)
1	would you mind going over a qeustion like spring 2018 final 8e, it's module 3 baseed I believe	sure, I can do it when I start the module 3 portion of the review; does that work?
2	yes thank you!	
3	aren't eigenvectors always distinct	Only when the eigenvalues are distinct. The eignevectors are then linearly independent
4	what is the purpose of v inverse again?	AV = Lambda matrix * V => A = V^-1 A V
5	Why is AV equal to the matrix of lambda values times the v vectors?	do it column by column. AV = [Av1, Av2, … Avn] = [lambda_1v_1 … lambdan_vn] = Lambda matrix * V
6	would the eigenvectors have to be made in a unit form for V lambda V inverse?	live answered
7	this is module 3 question, but do very negative cross correlation values indicate that there is a satellite present/a strong signal present at the shift or is it only for very large positive correlation values?	it is for both. We really only care about the magnitude of the correlation. If the satellitle decided to send a message of -1 instead of +1, the signal would flip across the x axis. This would cause a large negative cross correlation with the component signals.
8	do use diagnolization A has to be square right	live answered
9	If it had an eigenvalue of 0, doesn't that mean A is not linearly independent and shouldnt be diagonalizable?	Correct
10	is the question above always true, i.e in general if we find an eigenvalue of 0 then that is a way to tell if A is lin indep or not	yes. If we have an eigenvalue of zero, there exists some non zero vector v, namely the eigenvector, such that Av = 0. This is precisely the definition of linear depednence of the columns of A if you write out Av = a_1 v_1 + a2v2 … anvn
11	why is it x[0] now instead of x[1]?	using our state transition model, the left hand side is x[k+1] and the right hand side is in terms of x[k]. If we choose k=0, the left side will be in terms of x[1] and the right will be in terms of x[0]
12	wouldn't we have 4 equations becuase we need to go from x[0] to x[3]	we do have 4 equations
13	do we only need to find the equations of x[1] and x[2] since that gives 4 eqns for 4 unknwns	live answered
14	We don't plug in xh[1] into the second one right? Like xh[2] = a11(xh[0]+a12xh[0]+etcetc)	nope, we want our equations to be linear so that we can use least squares. We would get higher powers of the unknown a values if we did this.
15	why do we not need to make additions to the b vector with the third set of eqns?	thanks for catching that
16	Can we just say that since the column sum <1 it converges to 0	yeah, but only when the matrix is diagonal though. And this is really because the eigenvalues are the diagonal elements, so it is the same thing.
17	when would we have to find the alphas again?	live answered
18	we can always break down a vector times a matrix into the vector as a linear combo of eigenvals/vecs right?	Only if the matrix has linearly independent eigenvectors since only then would they form a basis. Note that in this case we know that we have two distinct eigenvalues, which, if you recall, is a sufficient condition for the eigenvectors to be linearly independent.
19	where do the eigenvalues come into play here at the end?	live answered
20	how'd you have the intuition to find the inner product between x and Az?	If we are trying to prove orthogonality, usually trying to express things as an inner product is useful because if we can show the inner product is zero, we have shown orthogonality.
21	So for part i), if we proved that<x, Az> = 0, how is this the same as <x, A^T>=0?	We know that Ax = 0 by the definition of the nullspace, which means that the inner product of x with each row of A^T is zero. We use that fact to prove the first inner product.
22	range is equivalent to column space right	yup!
23	For the projection formula did he substitute AT for A into the projection formula because x0 = Range(AT)?	We substitute A^T because in this case we are projecting onto the columns of A^T instead of the columns of A (which is the standard least squares that we're used to)

24	why do we square norms? norm is a measure of magnitude right?	The reason we square the norm is that it makes the algebra easier — the squared norm can be expressed as an inner product which is easy to work with, while the regular norm has a square root in it which makes it hard to manipulate. Because the norm is always non-negative, minimizing the squared norm is the same as minimizing the norm itself, so we can safely make the substitution without changing the problem
25	Could you post this question/these notes?	Yup, we will post these on the piazza post afterward
26	Why dont we use the projection formula	we can use projection when we are projecting onto the columns of a matrix A. In this problem, we were projecting onto the columnspace of A^T, which means we can't directly apply the normal projection formula
27	Not related to this current problem, but for least squares how do we prove that the error is perpendicular to Axhat	problem 4c on HW 12 (https://eecs16a.org/homework/sol12.pdf) shows this — essentially we can show that error of the least squares solution has an inner product of zero with all columns of A, so it is perpendicular to the columnspace of A
28	what problem/final is this cross corr from?	This is problem 5 from the final in Fall 2020
29	we use the inner product/normsquared formula only when it's a projection between two vectors right?	Yup, this only works when we are projecting onto a single vector. You can also think of this as the 1d case of the least squres formula, where (A^TA)^-1 becomes 1/(a^Ta), and A^Tb becomes <a,b>
30	so two vectors can not be orthoganal even if their dot prod is 0?	If the dot product is zero, the vectors will be orthogonal, except in the trivial case where one of the vectors is the zero vector.