#	Question	Answer(s)
1	can we just turn in our midterm answer sheet if we ran through the exam again but got the same exact answers/work?	you can, but either (a) you think all your answers are correct and I'm not sure why you want to clobber or (b) you're not sure of some answers, in which case you should go to OH or work with other students to check your understanding.
2	Since matrix multiplication matters, is that means <a b> is not equally to <b a>?	<a,b> is equal to <b,a>
3	Whats the difference between inner product and cross correlation?	Cross correlation is the many inner products between one vector and many shifted versions of it.
4	In the real world, how can r selectively talk to s_A or s_B? If both are sending out signals radially, won't r inevitbly be bombarded by both?	Yes in real world we usually hear from multiple transmitters at the same time. The good thing is if we design the 'songs' and keep the inner product of different 'songs' very small, our cross correlation method will still be able to find the correct delay from each transmitter despite of the overlapping singal. You will see an example in the coming homework 12.
5	Is the correlation a vector or a scalar?	cross-correlation outputs a vector, each element corresponds to a different shift (k).
6	Does y1 mean shifted by one to the right or left?	In this case, it means one shift to the left, i.e. it arrives later tin time
7	how do we know if we're shifted left or right?	The formula has x(i) and y(i-k). So x(0) correponds to y(-k). Effectively y is shifted to the right with respect to x if k is positive.
8	Do we multiply all these inner products to get the correlation?	No, we get a different inner product for each shift amount K. So we end up with a vector of inner products
9	What if the true shift was not an integer value? How would we determine the shift then?	since we are restricted to integer values in this system, then we could only tell integer shifts. We would need to design our sampling so that we can capture that "true shift" or tolerate small inaccuracies in the shift
10	why are we going from 0 to infinity instead of infinity to infinity	Here both signal start at 0, so i<0 means a zero sample. But the general formula should be from -inf to inf.
11	Couldn't we achieve a large inner product from a signal that is not closely correlated? Say we have two positive signals and we receive the smaller signal, wouldn't the larger inner product be the larger positive signal even though the signal is most similar to the small signal?	yup, that's a fair point. We generally have to do some amount of normalization to correct for that. We'll see that on the next homework
12	Why k=4 is not the shift?	Its not super clear with the noisy shift. We just have to calculate it
13	If s was not a hump and instead very sporadic, is true that the correlation would be a single spike and low everywhere (instead of a hump), b/c even being 1 off would not yield similar values bewteen the two?	There might be some special cases, but generally yes!
14	Are the waves amplyfing each other, is that why they get bigger?	graphically, thats is a fair intuition. What we're looking for in when the signals / songs look like each other. Their inner product is big then
15	why was the peak around three when the noisy chart and original chart appeared to peat at around 10?	k = 3 refers to the shift required to make inner product max out, which is when the charts are most similar
16	I thought the shift k was negative (because i–k) so wouldn't this mean we have to account for this in the graph?	The shift just refers to K, not -K, so we say its positive shift.
17	why does x - a = dA?	We're saying that the distance from point X and point A is d_A, from the picture
18	Is she using |x|^2=x(dot)x/is this true?	Yes ||x||^2 = <x, x> = x dot x.
19	how did the professor expand from (x-a)t(x-a) to the next line?	(x-a)^T = (x^T - a^T), then just expand the multiplication to 4 terms
20	How do we go from ||x-a|| to (x-a)T(x-a)? And then once we have that, how did we get to xTx + aTa - xTa - aTx?	||x-a||^2 = <x-a, x-a> = (x-a)^T (x-a) = (x^T - a^T)(x-a), then expand it to 4 terms.
21	im still slightly confused as to what the || x || notation means	||x|| is the norm of x, equal to the length
22	what does nonlinear mean here?	Nonlinear very generally means using something more than addition and scalar multiplication. So squaring is nonlinear
23	i know this was explained earlier but how is ||x||^2 nonlinear again?	We can check that ||ax||^2 does not equal to a||x||^2. Remeber for linearity we require f(ax) = af(x), and f(ax + by) = af(x) + bf(y).
24	When will the two linear equations have inf or no solutions?	Apply the Gaussian elimination and we will find it out!
25	should eq 5 be da^2 - dc^2?	yes, we should be using the C vector in eq 5
26	what is gaussian elimination	Gaussian elimination is our procedure for solving matrix problems in linear algebra, from module 1
27	is the final modular or cumulative	cumulative
28	Are we going to be learning more about circuits in this module or will it be heavily linear algebra based?	Module 3 will be largely linear algebra
29	how did A become 2 x 1	This is a new example.
30	does it mean anything in this context if the projection of b onto a is negative?	That would mean that generally, b is in the "opposite" direction of a, i.e. mostly pointing in the other direction
31	so b contains the error now right, hence why it is lifted off of the col(A)	Yes!