1a. +1: Clear proof that supports the condition in question.
1b. +1: Proof like: $||Ru||2 = (Ru)\ T\ (Ru) = u\ T\ RT\ Ru = u\ T\ (RT\ R)u = u\ T\ u = ||u||2$.
1c. +1: Proof like: Taking the determinant of both sides, we get det(R T R) = 1 (3) =⇒ det(R T) det(R) = 1 (4) =⇒ det2 (R) = 1 (5) =⇒ det(R) = ±1 (6) Moreover, both ±1 are possible determinants for an orthogonal
2a. +1: Proof like: First, we compute a matrix whose columns are comprised of our basis vectors. A = α1 · · · αn (7) Next, our change of basis matrix will be A−1 . With it, we can compute vα = A−1 v
2b. +1: Solution like: We must first invert one of our change of basis matrices. Gβα = G −1 αβ (9) 3 Now, we can compose our change of basis matrices to get the desired change of coordinates. Gγα = GγβGβα (10) vγ = Gγανα
2c. +1. False, +1: Proof like: Consider the vectors a = 1 1T , b = 1 0T . They are not currently orthogonal as a T b = 1 Define change of basis matrix B = a b−1 (12) We can define ˜a, ˜b as these vectors after the change of basis and see that they are now orthogonal a˜ = Ba = 1 0 (13) ˜b = Ba = 0 1 a˜ T ˜b = 0
2d. +1: True, +1: Start with some set of linearly independent vectors a = {a1, . . . , am}, for ai ∈ R n as given in the problem statement. We can extend this into a full basis that spans R n either by using a variation of the Gram-Schmidt process that doesn't discard the original vectors or performing repeated cross-products of existing vectors: a ∗ = {a1, . . . , am, b1, . . . , bn−m} (15) Now, we can define a change of basis matrix B = a1 · · · am b1 · · · bn−m −1 (16) Since a ∗ is comprised of linearly independent vectors, this B matrix must exist ([a ∗] must have an inverse). Our original set of vectors, when transformed into the new basis using B, are orthonormal. To see that this is the case, we can transform the full set of our original vectors into the new basis. We multiply the change of basis matrix by the original set of vectors: Ba∗ . This is effectively [a ∗] −1 [a ∗], which is the identity matrix. Our original set of vectors have become the elementary basis vectors, so they must now be orthogonal. In general, any linearly independent set of vectors is orthonormal in the basis where the basis vectors are themselves. Note that mentioning the Gram-Schmidt process alone cannot be used to justify this property. Our original set of vectors must be orthonormal in the new basis.
3a. +1: For answer other than do not know answer
3b. +1: For answer other than do not know answer
3c. +1: For answer other than do not know answer
3d. +1: For answer other than do not know answer
3e. +1: For answer other than do not know answer
4a. +1: For answer other than do not know answer
4b. +1: For answer other than do not know answer
4c. +1: For answer other than do not know answer
4d. +1: For answer other than do not know answer
5a. +1: mkdir Fa24
5b. +1: mkdir Fa24/EECS C106A OR cd Fa24 mkdir EECS C106A
5c. +1: mkdir Lab Homework
5d. +1: pwd
5e. +1: One way you can create this SID.txt file is by using something like Sublime Text, creating your file, and then saving it to the appropriate directory. Another way you can do this 12

is to navigate to the correct directory and run nano SID.txt or vim SID.txt and enter the appropriate contents and save.
5f. +1: cat SID.txt
5g. +1: rm Cleo contact.txt
5h. +1: ls
5i. +1: cd ../.., +1: mkdir ENGLISH R1B