**DAILY ASSESSMENT FORMAT**

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| **Date:** | **15-07-2020** | **Name:** | **Bhavith** |
| **Course:** | **Coursera** | **USN:** | **4AL17EC009** |
| **Topic:** | **Mod 2:Finding size of a vectors,its angle and projection.** | **Semester & Section:** | **6th,A** |
| **Github Repository:** | **Bhavith-Online-Courses.** |  |  |

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| **FORENOON SESSION DETAILS** |
| **Image of session**  **Screenshot (198)**  **Screenshot (197)** |
| **Report – Report can be typed or hand written for up to two pages.**   * **So we've looked at the two main vector operations of addition and scaling by a number.** * **Those are all the things we really need to be able to do to define what we mean by a vector, the mathematical properties that a vector has. Now, we can move on to define two things; the length of a vector, also called its size, and the dot product of a vector, also called it's inner scalar or projection product.** * **The dot product is this huge and amazing concept in linear algebra, with huge numbers of implications. I will only be able to touch on a few parts here, but enjoy. It's one of the most beautiful parts of linear algebra.** * **So when we define a vector, initially, say this guy r here, we did it without reference to any coordinate system. In fact, the geometric object, this thing r, just has two properties, its length and its direction that it's pointing that way.** * **So irrespective of the coordinate system we decided to use, we want to know how to calculate these two properties of length and direction. If the coordinate system was constructed out of two unit vectors that are orthogonal to each other, like i here and j here in 2D, then we can say that r is equal to a times i, plus b times j.** * **When unit about i and j, I mean that of length one, which people will often denote by putting a little hat over them like this. Then from Pythagoras, we can say that the length of r is given by the hypotenuse. So what I mean by that is,if we draw a little triangle here, then we've got this length here is ai. So if we write the length being, with these two little vertical lines, it's just of length a, because i is of length one.** * **This side here is bj, and that's of length b. So this side here is from Pythagoras, is just a squared plus b squared, all square rooted, and that's the size of r.** * **So we can write down r, quite often people will do this, write r down like this, just ignoring the i and j and writing it as a column vector. So r is equal to a-b. The size of r, we write down as being the square root of a squared plus b squared.** * **Now, we've done this for two spatial directions defined by unit vectors i and j that are at right angles to each other. But this definition of the size of a vector is more general than that. It doesn't matter if the different components of the vector or dimensions in space like here, or even things have different fiscal units like length, and time, and price.** * **We still define the size of a vector through the sums of the squares of its components. The next thing we're going to do is to find the dot product. One way among several, multiplying if you'd like two vectors together.** * **If we have two vectors, r and s here, r here has components r\_i, r\_j, so r in the i direction, r in the j direction, and s has components s\_i and s\_j, then we define r dotted with s to be given by multiplying the i components together. So that's r\_i times s\_i, and adding the j components together, so that's r\_j times s\_j.Play video starting at 3 minutes 48 seconds and follow transcript The dot product is just a number, a scalar number, about three, given by multiplying the components of the vector together in turn, and adding those up.** * **So in this case, that would be three and two, for the rij, and minus one, and two for s. So if we do that, then we get a sum, the r.s is equal to minus three plus four, which gives us one. So r.s in this case, it's just one. Now, we need to prove some properties of the dot product. First, it's commutative.** |