What is the dot product of a vector with itself?

If I have a vector A and I dot it with itself, then according to our definition it would be A x squared plus A y squared plus A z squared.

Now keep in mind that the magnitude of A itself is the square root of Ax squared plus Ay squared plus Az squared. So this is nothing but the magnitude of A squared.

So if we take our famous vector A, which was 3 x roof minus 2 y roof plus 4 z roof, then the magnitude of that vector equals the square root of 29. But A dot A, which is a scalar. And you can check that easily by applying this rule. You will see that that is 29, which is exactly the square of the magnitude of A.