

- Question: Can magnitude be negative? Can it be zero?
- Answer: Magnitude cannot be negative. It is the length of the vector which does not have a direction (positive or negative). In the formula, the values inside the summation are squared, which makes them positive.
- The zero vector (vector where all values are 0) has a magnitude of 0, but all other vectors have a positive magnitude.

- Question: Can distance be negative? Can it be zero?
- Answer: Distance is non-negative for the same reasons as magnitude (it is a measure of length, and the formula squares the values).
- The distance between two identical vectors is 0, otherwise distance will be positive.

- Question: Can dot product be negative? Can it be zero?
- Answer: The dot product can be any real value, including negative and zero.
- The dot product is 0 only if the vectors are *orthogonal* (form a right angle). If the dot product is 0, the cosine similarity will also be 0.

- Question: If you add two vectors, which each have 3 dimensions, is the result a vector or scalar? If a vector, how many dimensions?
- Answer: If you add two 3-dimensional vectors together, the result is a 3-dimensional vector.

- Question: If you concatenate two vectors, which each have 3 dimensions, is the result a vector or scalar? If a vector, how many dimensions?
- Answer: Concatenation of two 3-dim vectors will result in one 6-dimensional vector.

- Question: If you take the dot product of two vectors, which each have 3 dimensions, is the result a vector or scalar? If a vector, how many dimensions?
- Answer: The dot product returns a scalar.
- (Other types of products exist for vectors that return other variable types, like vectors and matrices, but those are not covered in this class.)