

# 10.

If vector  $u = [x, y, z]$ 

$$u \cdot u = [x, y, z] \cdot [x, y, z] = (x^2 + y^2 + z^2)$$

$$|u| = \sqrt{x^2 + y^2 + z^2}$$

$$|u|^2 = x^2 + y^2 + z^2$$

$$u \cdot u = |u|^2$$

I can easily see they mean the same thing

But I am not sure how to answer

"What exactly do they mean?"

# 11.

$$(u - v) \cdot (u - v) = u \cdot u - 2u \cdot v + v \cdot v$$

$$u \cdot u = [3, 2] \cdot [3, 2] \quad u \cdot v = [3, 2] \cdot [2, 1]$$

$$v \cdot v = [2, 1] \cdot [2, 1]$$

$$[1, 1] \cdot [1, 1] = 13 - 16 + 5$$

$$2 = 2$$

How do I prove this without using components?