Cosine similarity:

$$\mathbf{a} = \langle 1, 2, 3, 4 \rangle, \mathbf{b} = \langle 4, 3, 2, 1 \rangle$$

$$\cos(\mathbf{a}, \mathbf{b}) = \frac{\mathbf{a} \cdot \mathbf{b}}{\|\mathbf{a}\| \, \|\mathbf{b}\|}$$

$$\mathbf{a} \cdot \mathbf{b} = 4 + 6 + 6 + 4 = 20$$

$$\|\mathbf{a}\| \, \|\mathbf{b}\| = (\sqrt{30})^2 = 30$$

$$\cos(\mathbf{a}, \mathbf{b}) = \frac{20}{30} = \frac{2}{3}$$

If $\mathbf{b} = -\mathbf{a} = \langle -1, -2, -3, -4 \rangle$

$$\mathbf{a} \cdot \mathbf{b} = -1 - 4 - 9 - 16 = -30$$

$$\|\mathbf{a}\| \, \|\mathbf{b}\| = (\sqrt{30})^2 = 30$$

$$\cos(\mathbf{a}, \mathbf{b}) = \frac{-30}{30} = -1$$