

cálculo 2, Stewart vol 2, ed 8, cap 12.3

$$3 \quad a \cdot b = 1,5 \cdot -4 + 0,4 \cdot 6 = -3,6$$

$$7 \quad a = (1, -2, 3) \quad b = (5, 0, 9)$$

$$a \cdot b = 5 + 0 + 27 = 32$$

$$9 \quad \vec{u} \cdot \vec{v} = |\vec{u}| |\vec{v}| \cos \theta$$

$$\cos \theta = \cos 30^\circ = \sqrt{3}/2 \quad \rightarrow \quad \vec{u} \cdot \vec{v} = 7 \cdot 4 \cdot \sqrt{3}/2 = 14\sqrt{3}$$

$$11 \quad \vec{u} \cdot \vec{v} = -1 \cdot -1 \cdot \cos 60^\circ = 1/2$$

$$u \cdot \vec{u} = -1 \cdot -1 \cdot \cos 60^\circ = -1/2$$

$$15 \quad \cos \theta = \frac{a \cdot b}{|a| \cdot |b|} = \frac{8 - 3}{5 \cdot \sqrt{5}} = \frac{5}{5\sqrt{5}} = \frac{1}{\sqrt{5}}$$

$$|a| = \sqrt{16 + 9} = \sqrt{25} = 5$$

$$|b| = \sqrt{4 + 1} = \sqrt{5}$$

$$17 \quad \cos \theta = \frac{a \cdot b}{|a| \cdot |b|} = \frac{0 - 8 - 2}{\sqrt{18} \cdot \sqrt{8}} = \frac{-10}{\sqrt{144}} = \frac{-10}{12} = -\frac{5}{6}$$

$$|a| = \sqrt{1 + 16 + 1} = \sqrt{18}$$

$$|b| = \sqrt{0 + 4 + 4} = \sqrt{8}$$

$$23A \quad a \cdot b = -18 + 18 = 0$$

ortogonais

$$B \quad a \cdot b = 12 - 5 - 10 = -3 \quad \text{não é ortogonal}$$

$$\cos \theta = \frac{a \cdot b}{|a| \cdot |b|} = \frac{-3}{\sqrt{45} \cdot \sqrt{15}} \neq 1 \quad \text{não são paralelos}$$

$$|a| = \sqrt{16 + 25 + 4} = \sqrt{45}$$

$$|b| = \sqrt{9 + 1 + 5} = \sqrt{15}$$

$$6 \quad a = (-8, 12, 4) \quad b = (6, -9, -3)$$

$$\cos \theta = \frac{a \cdot b}{|a| \cdot |b|} = \frac{-48 - 108 - 12}{\sqrt{288} \cdot \sqrt{168}} = \frac{-168}{168} = -1 \quad \text{paralelos}$$

$$|a| = \sqrt{64 + 144 + 16} = \sqrt{224}$$

$$|b| = \sqrt{36 + 81 + 9} = \sqrt{129}$$

$$33 \quad \cos \alpha = \frac{x_1}{\|\vec{u}\|}, \quad \cos \beta = \frac{y_1}{\|\vec{u}\|}, \quad \cos \gamma = \frac{z_1}{\|\vec{u}\|}$$

$$\|\vec{u}\| = \sqrt{4+1+4} = \sqrt{9} = 3$$

$$\cos \alpha = \frac{2}{3} \quad \cos \beta = \frac{1}{3} \quad \cos \gamma = \frac{2}{3}$$

$$37 \quad \|\vec{u}\| = \sqrt{c^2 + c^2 + c^2} = \sqrt{3c^2} = \sqrt{3} \cdot \sqrt{c^2} = c\sqrt{3}$$

$$\cos \alpha, \cos \beta, \cos \gamma = \frac{c}{c\sqrt{3}} = \frac{1}{\sqrt{3}}$$

$$39 \quad \text{proj}_b^a = \left(\frac{b \cdot a}{\|b\| \|b\|} \right) \cdot b = \left(\frac{45}{85} \right) \cdot b = \left(\frac{54}{17}, \frac{63}{17} \right)$$

$$b \cdot a = 4 \cdot 6 + 3 \cdot 7 = 45$$

$$\|b\| = \sqrt{36 + 49} = \sqrt{85}$$

$$\text{comp}_b^a = \frac{a \cdot b}{\|b\|} = \frac{45}{\sqrt{85}}$$

$$\text{proj}_a^b = \left(\frac{a \cdot b}{\|a\| \|a\|} \right) a = \frac{45}{25} \cdot a = \left(\frac{36}{5}, \frac{27}{5} \right)$$

$$\text{comp}_a^b = \left(\frac{a \cdot b}{\|a\|} \right) = \frac{45}{\sqrt{25}} = 9$$

$$41 \quad \text{proj}_a^b = \left(\frac{b \cdot a}{\|a\| \|a\|} \right) a = \frac{1}{81} \cdot a = \left(\frac{4}{81}, \frac{7}{81}, \frac{-4}{81} \right)$$

$$\text{comp}_a^b = \left(\frac{b \cdot a}{\|a\|} \right) = \frac{1}{9}$$

$$b \cdot a = 12 - 7 - 4 = 1$$

$$\|a\| = \sqrt{16 + 49 + 16} = \sqrt{81} = 9$$