

$$77) a) \vec{a} = \langle -4, 3 \rangle, \vec{b} = \langle 6, 2 \rangle$$

$$|\vec{a}| = \sqrt{(-4)^2 + 3^2} = \sqrt{16+9} = \sqrt{25} = 5 \quad \vec{a} + \vec{b} = \langle -4, 3 \rangle + \langle 6, 2 \rangle = \langle 2, 5 \rangle$$

$$\vec{a} - \vec{b} = \langle -4, 3 \rangle - \langle 6, 2 \rangle = \langle -10, 1 \rangle \quad 2\vec{a} = 2\langle -4, 3 \rangle = \langle -8, 6 \rangle$$

$$3\vec{a} + 4\vec{b} = 3\langle -4, 3 \rangle + 4\langle 6, 2 \rangle = \langle -12, 9 \rangle + \langle 24, 8 \rangle = \langle 12, 17 \rangle$$

$$b) \vec{a} = 2\hat{i} - 3\hat{j}, \vec{b} = 2\hat{i} + 5\hat{j}$$

$$|\vec{a}| = \sqrt{(2)^2 + (-3)^2} = \sqrt{4+9} = \sqrt{13}$$

$$\vec{a} + \vec{b} = 2\hat{i} - 3\hat{j} + 2\hat{i} + 5\hat{j} = 4\hat{i} + 2\hat{j}$$

$$\vec{a} - \vec{b} = 2\hat{i} - 3\hat{j} - 2\hat{i} - 5\hat{j} = -8\hat{j}$$

$$2\vec{a} = 2(2\hat{i} - 3\hat{j}) = 4\hat{i} - 6\hat{j}$$

$$3\vec{a} + 4\vec{b} = 3(2\hat{i} - 3\hat{j}) + 4(2\hat{i} + 5\hat{j}) = 6\hat{i} - 9\hat{j} + 8\hat{i} + 20\hat{j} = 14\hat{i} + 11\hat{j}$$

$$79) |\vec{a}| = 6, |\vec{b}| = \frac{2}{3} \quad \angle(\vec{a}, \vec{b}) = \frac{\pi}{4}$$

$$\cos \theta = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}| |\vec{b}|} \Rightarrow \vec{a} \cdot \vec{b} = \cos \theta |\vec{a}| |\vec{b}| = \cos \frac{\pi}{4} \cdot 6 \cdot \frac{2}{3} = \frac{\sqrt{2}}{2} \cdot 4 = 2\sqrt{2}$$

\therefore O produto escalar entre os vetores \vec{a} e \vec{b} é de $2\sqrt{2}$.

$$80) a) \vec{a} = \langle -4, 3 \rangle, \vec{b} = \langle 6, 2 \rangle$$

$$\vec{a} \cdot \vec{b} = a_1 b_1 + a_2 b_2 = (-4 \cdot 6) + (3 \cdot 2) = -24 + 6 = -18.$$

$$b) |\vec{a}| = 5, |\vec{b}| = \sqrt{5} \quad \angle(\vec{a}, \vec{b}) = \frac{\pi}{6}$$

$$\vec{a} \cdot \vec{b} = \cos \theta |\vec{a}| |\vec{b}| = \cos \frac{\pi}{6} \cdot 5 \cdot \sqrt{5} = \frac{\sqrt{3}}{2} \cdot 5\sqrt{5} = \frac{5\sqrt{15}}{2}$$