

$$5. \quad v = -2i + 5j \quad w = 4i + j$$

$$v_1 = \frac{v \cdot w}{\|w\|^2} w$$

$$v_0 = v - v_1$$

$$v_1 = \frac{-2(4) + 5(1)}{(\sqrt{4^2 + 1^2})^2} (4i + j)$$

$$v_0 = (-2i + 5j) - \left(-\frac{12}{17}i - \frac{3}{17}j\right)$$

$$= -2i + 5j + \frac{12}{17}i + \frac{3}{17}j$$

$$= \frac{-8 + 5}{17} (4i + j)$$

$$= \left(-2 + \frac{12}{17}\right)i + \left(5 + \frac{3}{17}\right)j$$

$$= -\frac{3}{17} (4i + j)$$

$$= \left(\frac{-22}{17}i + \frac{88}{17}j\right)$$

$$= \left(\frac{-12}{17}i - \frac{3}{17}j\right)$$