Question #17344 Given vector $u = (0, 3, 3)$ and vector $v = (-1, 1, 1)$. a) Find the projection of u onto v, and b) Find the vector component of u orthogonal to v. [Give your answers in the form of linear combination of the standard unit vectors (i ,j , and k)].

Solution. .a) projection of u onto v is given by the formula $proj_v(u) = \dfrac{(u,v)}{(v,v)}v = \dfrac{6}{3}v = 2v$, so $proj_v(u) = -2i + 2j + 2k$.
b) This component equals $u - proj_v(u) = (2, 1, 1) = 2i + j + k$.
Answer.a)$-2i + 2j + 2k$, b) $2i + j + k$.