

Boas 3-4.15

(a) Find  $u$  along  $A = 2i - j + 2k$

$$A = \sqrt{2^2 + (-1)^2 + 2^2} = \sqrt{9} = 3$$

$$u_A = \frac{A}{|A|} = \frac{2}{3}i - \frac{1}{3}j + \frac{2}{3}k$$

$$u_A = .67i - .33j + .67k$$

(b)  $v_A = 12u = 8i - 4j + 8k$

(c) Find  $v \perp A$ .  $v \cdot A = 0$  and  $v = B \times A$   
where  $B$  is any vector. Let  $B = i, j,$  or  $k$ ; choose  $i$

$$\text{Then } B \times A = \begin{vmatrix} i & j & k \\ 1 & 0 & 0 \\ 2 & -1 & 2 \end{vmatrix} = 0i - j(2-0) + (-1-0)k = -2j - k$$

Hence,  $v = -2j - k$  is an example. There are an infinite no. of such vectors

(d)  $u = \frac{v}{|v|} = \frac{-2j - k}{\sqrt{5}}$  etc.