Calculus III Quiz 2 Spring 2000 3/31/2000

1. Find $\langle 3,0,-2\rangle \cdot \langle -1,2,7\rangle$.

$= (3)(-1) + (0)(2) + (-2)(7) = -3 + 0 - 14$

$\langle 3,0,-2\rangle \cdot \langle -1,2,7\rangle = -17$

2. Find $\langle 3,0,-2\rangle \times \langle -1,2,7\rangle$.

$\langle 3,0,-2\rangle \times \langle -1,2,7\rangle$

$$\begin{vmatrix} i & j & k \\ 3 & 0 & -2 \\ -1 & 2 & 7 \end{vmatrix} = i\begin{vmatrix} 0 & -2 \\ 2 & 7 \end{vmatrix} - j\begin{vmatrix} 3 & -2 \\ -1 & 7 \end{vmatrix} + k\begin{vmatrix} 3 & 0 \\ -1 & 2 \end{vmatrix}$$

$0 - -4 = +4$ $\quad 21 - 2 = 19$ $\quad 6 - 0 = 6$

$4i - 19j + 6k = \langle 4, -19, 6\rangle$

3. Are the vectors $\mathbf{a} = 3\mathbf{i} + 2\mathbf{j} + \mathbf{k}$ and $\mathbf{b} = -\mathbf{i} + \mathbf{j} + \mathbf{k}$ perpendicular?

$a \cdot b = |a||b|\cos\theta$, if $\theta = 90$, then $a \cdot b = 0$

$a \cdot b = \langle 3,2,1\rangle \cdot \langle -1,1,1\rangle$

$= -3 + 2 + 1 = 0$

YES. PERPENDICULAR