8-4

Practice

Perpendicular Vectors

Find each inner product and state whether the vectors are perpendicular. Write yes or no.

1. $\langle 3, 6\rangle \cdot \langle -4, 2\rangle$

2. $\langle -1, 4\rangle \cdot \langle 3, -2\rangle$

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

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

5. $\langle -4, -1, 1\rangle \cdot \langle 1, -3, 4\rangle$

6. $\langle 0, 0, 1\rangle \cdot \langle 1, -2, 0\rangle$

Find each cross product. Then verify that the resulting vector is perpendicular to the given vectors.

7. $\langle 1, 3, 4\rangle \times \langle -1, 0, -1\rangle$

8. $\langle 3, 1, -6\rangle \times \langle -2, 4, 3\rangle$

9. $\langle 3, 1, 2\rangle \times \langle 2, -3, 1\rangle$

10. $\langle 4, -1, 0\rangle \times \langle 5, -3, -1\rangle$

11. $\langle -6, 1, 3\rangle \times \langle -2, -2, 1\rangle$

12. $\langle 0, 0, 6\rangle \times \langle 3, -2, -4\rangle$

13. ***Physics*** Janna is using a force of 100 pounds to push a cart up a ramp. The ramp is 6 feet long and is at a 30° angle with the horizontal. How much work is Janna doing in the vertical direction? (*Hint:* Use the sine ratio and the formula $W = \vec{\mathbf{F}} \cdot \vec{\mathbf{d}}$.)