13.4 The Cross Product

Name: Date:

P 1. Find $\vec{v} \times \vec{w}$, where $\vec{v} = \vec{k}$ and $\vec{w} = \vec{j}$.

P 4. Find $\vec{v} \times \vec{w}$, where $\vec{v} = \vec{i} + \vec{j} + \vec{k}$ and $\vec{w} = \vec{i} + \vec{j} - \vec{k}$.

P 8. Find $2\vec{i} \times (\vec{i} + \vec{j})$.

P 15. Find an equation for the plane through the points $(3, 4, 2)$, $(-2, 1, 0)$, and $(0, 2, 1)$.

P 25. Find a vector parallel to the intersection of the planes $2x-3y+5z=2$ and $4x+y-3z=7$.

P 26. Find the equation of the plane through the origin that is perpendicular to the line of intersection of the planes in problem 25.

P 35. Why does a baseball curve? The baseball below has velocity $\vec{v}$ meters/sec and it is spinning at ω radians per second about an axis in the direction of the unit vector $\vec{n}$. The ball experiences a force, called the Magnus force, $\vec{F}_M$, that is proportional to $\omega\vec{n} \times \vec{v}$.

(a) What is the effect on $\vec{F}_M$ of increasing ω?

(b) The ball above is moving away from you. What is the direction of the Magnus force?

P 54. Explain what is wrong with the statement. "There is only one unit vector perpendicular to two nonparallel vectors in 3-space."

P 55. Explain what is wrong with the statement. $\vec{u} \times \vec{v} = \vec{0}$ when $\vec{u}$ and $\vec{v}$ are perpendicular.