Last name _		
First name		

LARSON—MATH 310—CLASSROOM WORKSHEET 03 Dot Products

Review

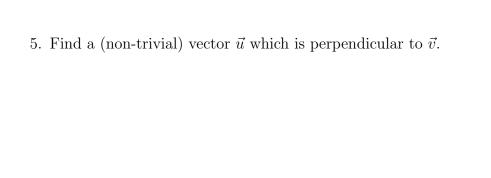
- What is $\vec{v} \cdot \vec{w}$?
- What is $\|\vec{v}\|$?
- What is a *unit* vector?
- How can you find a unit vector in the direction of \vec{v} ?
- Check that if \vec{u} is a unit vector then $\vec{u} \cdot \vec{u} = 1$.
- Check that if \vec{v} and \vec{w} are vectors that point in the same direction then $\vec{v} \cdot \vec{w} = ||\vec{v}|| \cdot ||\vec{w}||$.

Let
$$\vec{v} = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$$
 and $\vec{w} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$.

1. Check that if the angle between \vec{v} and \vec{w} is θ then $\cos \theta = \frac{\vec{v}}{\|\vec{v}\|} \cdot \frac{\vec{w}}{\|\vec{w}\|}$.

2. Check that if \vec{v} and \vec{w} are perpendicular then $\vec{v} \cdot \vec{w} = 0$.

3. Let θ be the angle between \vec{v} and \vec{w} . Find $\cos \theta$.



Cauchy's Inequality. For any vectors \vec{v} , \vec{w} , $\vec{v} \cdot \vec{w} \le ||\vec{v}|| ||\vec{w}||$.

6. Check that Cauchy's Inequality holds for vectors \vec{v} , \vec{w} .

7. Why is Cauchy's Inequality true?

Triangle Inequality : $\|\vec{v} + \vec{w}\| \le \|\vec{v}\| + \|\vec{w}\|$.

8. Check that the Triangle Inequality holds for vectors \vec{v} , \vec{w} .

9. Why is the Triangle Inequality true?