Week in Review # 12

MATH 150

7.8 through 8.8 Drost-Fall 2002

7.8 **Dot Product**

Given $\vec{u} =< a_1, b_1 >, \vec{v} =< a_2, b_2 >$

$\vec{u} \bullet \vec{v} = a_1 \cdot a_2 + b_1 \cdot b_2$

$\vec{u} \bullet \vec{v} = ||\vec{u}|| \cdot ||\vec{v}|| \cdot \cos\theta$

$\cos\theta = \dfrac{\vec{u} \bullet \vec{v}}{||\vec{u}|| \cdot ||\vec{v}||}$

$\vec{u} \bullet \vec{v} = 0$ if $\vec{u}$ and $\vec{v}$ are perpendicular

The component of $\vec{u}$ along $\vec{v}$ is $\dfrac{\vec{u} \bullet \vec{v}}{||\vec{v}||}$

$\text{proj}_{\vec{v}}\, \vec{u} = \dfrac{\vec{u} \bullet \vec{v}}{||\vec{v}||^2} \cdot \vec{v}$

$W = F \bullet D$

1. Find the angle between $\vec{u} =< -6, 6 >$ and $\vec{v} =< 1, -1 >$

2. Determine if $\vec{u} =< -6, 3 >$ and $\vec{v} =< \frac{1}{2}, 1 >$ are orthogonal.

3. Find the component of $\vec{u}$ along $\vec{v}$ if $\vec{u} = 7i$ and $\vec{v} = 8i + 6j$

4. Find the projection of $\vec{u}$ on $\vec{v}$ for the vectors $\vec{u} =< 11, 3 >$ and $\vec{v} =< -3, -2 >$

5. Find the work done by the force F in moving from P to Q when $F = -4i + 20j$, $P = (0, 10)$ and $Q = (5, 25)$.

6. A lawn mover is pushed a distance of 200 feet along a horizontal path by a constant force of 50 lbs. The handle is held at an angle of 30^o from the horizontal. Find the work done.

7. A car is on a driveway that is inclined 25^o to the horizontal. If the car weighs 2755 lb., find the force required to keep it from rolling downthe driveway.

8.1 **Systems of Equations**

8. Solve the following system:

$$\begin{cases} 4x - 3y &= 11 \\ 8x + 4y &= 12 \end{cases}$$

9. Solve the following system:

$$\begin{cases} x^2 - y^2 &= 1 \\ 2x^2 - y^2 &= x + 3 \end{cases}$$

10. A right triangle has an area of 336 square inches and a hypotenuse of 50 in. What are the lengths of the other two sides?

8.8 **Systems of Inequalities**

11. Graph the solution:

$$\begin{cases} x + 2y &\leq 14 \\ 3x - y &\geq 0 \\ x - y &\geq 2 \end{cases}$$

12. Graph the solution:

$$\begin{cases} x + y &> 12 \\ y &< \frac{1}{2}x - 6 \\ 3x + y &< 6 \end{cases}$$

13. A man and his daughter manufacture unfinished tables and chairs. Each table requires 3 hours of sawing and 1 hour of assembly. Each chair requires 2 hours of sawing and 2 hours of assembly. The two of them can put in up to 12 hours of sawing and 8 hrs of assembly work each day. Find a system of inequalities that describes all possible combinations of tables and chairs that they can make daily. Graph the solution set.

ANSWERS:

1. π

2. yes, perpendicular

3. 5.6

4. $< 9, 6 >$

5. 280

6. 8660.25 ft-lb

7. 1164 lb.

8. $(2, -1)$

9. $(2, \pm\sqrt{3}), (-1, 0)$

10. 14", 48"