

## Math 252 Cumulative Review (Problems)

1. Given  $\vec{u} = \langle 8, -4, 1 \rangle$  and  $\vec{v} = \langle -4, 4, 2 \rangle$ ,  
find  $\vec{u} \cdot \vec{v}$ .
2. Find a vector orthogonal to the plane determined by the points  $P(-2, 0, 3)$ ,  $Q(1, 2, 4)$ ,  
and  $R(-3, 1, 0)$ .
3. Using  $u = \langle 8, 3, -5 \rangle$ ,  $v = \langle 4, -4, -2 \rangle$ ,  
find  $3u - 4v$ .
4. Given  $\vec{u} = \langle 8, -4, 1 \rangle$  and  $\vec{v} = \langle -4, 4, 2 \rangle$ ,  
find  $\vec{u} \times \vec{v}$ .
5. Find the set of parametric equations for the  
line through  $Q(1, 2, 4)$  and parallel to  $a = \langle 4, -3, -2 \rangle$ .
6. Find the center and radius of the sphere given  
by  $x^2 + y^2 + z^2 - 8x + 6y = 0$
7. Given  $\vec{u} = \langle 8, -4, 1 \rangle$  and  $\vec{v} = \langle -4, 4, 2 \rangle$ ,  
find  $\|\vec{u}\|$  and  $\|\vec{v}\|$ .
8. Using  $u = \langle 8, 3, -5 \rangle$ ,  $v = \langle 4, -4, -2 \rangle$ ,  
find  $\|u\|$ ,  $\|v\|$ .
9. Given  $\vec{u} = \langle 8, -4, 1 \rangle$  and  $\vec{v} = \langle -4, 4, 2 \rangle$ ,  
find  $\text{proj}_{\vec{v}} \vec{u}$ .
10. Given  $\vec{u} = \langle 8, -4, 1 \rangle$  and  $\vec{v} = \langle -4, 4, 2 \rangle$ ,  
find the angle  $\theta$  between  $\vec{u}$  and  $\vec{v}$ .
11. Find the distance from the point  $(-4, -1, 5)$   
to the plane determined by the points  
 $P(-2, 0, 3)$ ,  $Q(1, 2, 4)$ , and  $R(-3, 1, 0)$ .
12. Find an equation of the plane passing  
through the points  $P(-2, 0, 3)$ ,  $Q(1, 2, 4)$ , and  
 $R(-3, 1, 0)$ .

## Math 252 Cumulative Review (Answers)

1. (Math-252 Quiz 2)

$$\vec{u} \cdot \vec{v} = -46$$

2. (Math-252 Quiz 3)

$$\vec{n} = \vec{PQ} \times \vec{PR} = \langle -7, 8, 5 \rangle$$

3. (Math-252 Quiz 1)

$$\langle 8, 25, -7 \rangle$$

4. (Math-252 Quiz 2)

$$\vec{u} \times \vec{v} = \langle -12, -20, 16 \rangle$$

5. (Math-252 Quiz 3)

$$x = 1 + 4t, y = 2 - 3t, z = 4 - 2t; t \in \mathbb{R}$$

6. (Math-252 Quiz 1)

$$C(4, -3, 0), \rho = 5$$

7. (Math-252 Quiz 2)

$$\|\vec{u}\| = 9, \|\vec{v}\| = 6$$

8. (Math-252 Quiz 1)

$$\|u\| = 7\sqrt{2}, \|v\| = 6$$

9. (Math-252 Quiz 2)

$$\text{proj}_{\vec{v}} \vec{u} = -\frac{23}{18} \langle -4, 4, 2 \rangle = \langle -\frac{46}{9}, -\frac{46}{9}, -\frac{23}{9} \rangle$$

10. (Math-252 Quiz 2)

$$\theta = \arccos\left(-\frac{23}{27}\right) = 148.4^\circ$$

11. (Math-252 Quiz 3)

$$h = \frac{16}{\sqrt{138}}$$

12. (Math-252 Quiz 3)

$$-7x + 8y + 5z = 29$$