

Math 252 Cumulative Review (Problems)

1. Given $\vec{u} = \langle 8, -4, 1 \rangle$ and $\vec{v} = \langle -4, 4, 2 \rangle$, find the angle θ between \vec{u} and \vec{v} .
2. Identify via cross-sections the surface defined by the following:
14. Given $\vec{u} = \langle 8, -4, 1 \rangle$ and $\vec{v} = \langle -4, 4, 2 \rangle$, find $\text{proj}_{\vec{v}}\vec{u}$.
15. Given $\vec{u} = \langle 8, -4, 1 \rangle$ and $\vec{v} = \langle -4, 4, 2 \rangle$, find $\|\vec{u}\|$ and $\|\vec{v}\|$.

$$y = x^2$$

16. Using $u = \langle 8, 3, -5 \rangle, v = \langle 4, -4, -2 \rangle$, find $\|u\|, \|v\|$.

3. Identify via cross-sections the surface defined by the following:

$$2y^2 = 3z^2 = 12$$

4. 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 $R(-3, 1, 0)$.
5. Find the center and radius of the sphere given by $x^2 + y^2 + z^2 - 8x + 6y = 0$.
6. Find the set of parametric equations for the line through $Q(1, 2, 4)$ and parallel to $a = \langle 4, -3, -2 \rangle$.
7. Identify via cross-sections the surface defined by the following:

$$3^2 - y^2 + 3z^2 + 9 = 0$$

8. Find a vector orthogonal to the plane determined by the points $P(-2, 0, 3)$, $Q(1, 2, 4)$, and $R(-3, 1, 0)$.
9. Identify via cross-sections the surface defined by the following:

$$x = 3y^2 + 5z^2$$

10. Given $\vec{u} = \langle 8, -4, 1 \rangle$ and $\vec{v} = \langle -4, 4, 2 \rangle$, find $\vec{u} \cdot \vec{v}$.
11. Given $\vec{u} = \langle 8, -4, 1 \rangle$ and $\vec{v} = \langle -4, 4, 2 \rangle$, find $\vec{u} \times \vec{v}$.
12. Find an equation of the plane passing through the points $P(-2, 0, 3)$, $Q(1, 2, 4)$, and $R(-3, 1, 0)$.
13. Using $u = \langle 8, 3, -5 \rangle, v = \langle 4, -4, -2 \rangle$, find $3u - 4v$.

Math 252 Cumulative Review (Answers)

1. (Math-252 Quiz 2)

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

2. (Math-252 Quiz 4)

Parabolic cylinder

3. (Math-252 Quiz 4)

Elliptical cylinder

4. (Math-252 Quiz 3)

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

5. (Math-252 Quiz 1)

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

6. (Math-252 Quiz 3)

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

7. (Math-252 Quiz 4)

Circular hyperboloid of two sheets

8. (Math-252 Quiz 3)

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

9. (Math-252 Quiz 4)

Elliptical paraboloid

10. (Math-252 Quiz 2)

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

11. (Math-252 Quiz 2)

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

12. (Math-252 Quiz 3)

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

13. (Math-252 Quiz 1)

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

14. (Math-252 Quiz 2)

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

15. (Math-252 Quiz 2)

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

16. (Math-252 Quiz 1)

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