

Hon Pre-Calc Test Chapter 11 2016 - 2017

Show All Work For FULL Credit!!! Circle All Final Answers!!!!

1. Find the equation of the sphere (in center radius form) with endpoints of its diameter at (2, 3, -2) and (6, 5, 8)

2. Find the exact volume of the sphere given by the equation:

$$9x^2 + 9y^2 + 9z^2 - 18x - 6y - 72z + 73 = 0$$

3. Find vector  $\vec{z}$ , given  $\vec{u} = \langle -1, 3, 2 \rangle$ ,  $\vec{v} = \langle 1, -2, -2 \rangle$ , and  $\vec{w} = \langle 5, 0, -5 \rangle$  if  $2\vec{z} - 4\vec{u} = \vec{w}$

4. Given:  $\vec{u} = 8i + 3j - k$  and  $\vec{v} = -3i + 5j + 10k$

a) Find a unit vector in the direction of  $\vec{u}$

b) Find  $\|\vec{v}\|$

c) Find  $\vec{u} \cdot \vec{v}$

d) Find the angle between  $\vec{u}$  and  $\vec{v}$  in degrees rounded to nearest hundredth.

5. The components of vector  $\vec{v}$  and its new initial point are given. Find the new terminal point.

$$\vec{v} = \langle 4, \frac{3}{2}, -\frac{1}{4} \rangle \quad \text{initial point} = (2, 1, -\frac{3}{2})$$

6. Determine if  $\vec{u}$  and  $\vec{v}$  are parallel, orthogonal, or neither.

a)  $\vec{u} = \langle -1, 3, -1 \rangle, \quad \vec{v} = \langle 2, -1, 5 \rangle$

b)  $\vec{u} = \langle -2, 3, -1 \rangle, \quad \vec{v} = \langle 2, 1, -1 \rangle$

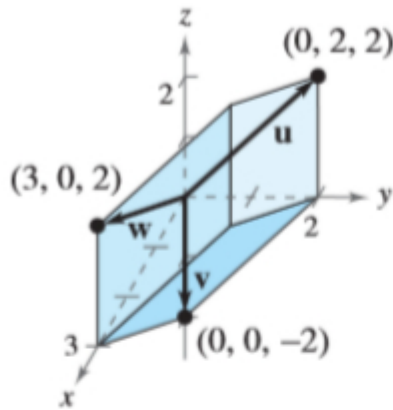
7. Determine the value of  $c$  such that  $\|c\vec{u}\| = 12$ , where  $\vec{u} = -2\mathbf{i} + 2\mathbf{j} - 4\mathbf{k}$

8. Write the **exact** component form of  $\vec{v}$  if  $\vec{v}$  lies in the  $xz$  plane, has magnitude 10, and makes an angle of  $60^\circ$  with the positive  $z$ -axis.

9. Find the a unit vector that is orthogonal to both  $\vec{u}$  and  $\vec{v}$  if  $\vec{u} = \mathbf{i} + \mathbf{j} - \mathbf{k}$  and  $\vec{v} = \mathbf{i} + \mathbf{j} + \mathbf{k}$

10. Find the area of the parallelogram ABCD with the following vertices: A(3, 2, -1), B(-2, 2, -3), C(3, 5, -2), D(-2, 5, -4)

11. Find the volume of the given parallelepiped.



12. Find a set of parametric equations of the line that...

a) passes through  $(-3, 8, 15)$  and  $(1, -2, 16)$

b) passes through  $(2, -3, 5)$  and is parallel to

$$\begin{cases} x = 5 + 2t \\ y = 7 - 3t \\ z = -7 + t \end{cases}$$

13. Find the general form of the equation of the plane passing through  $(5, -1, 4)$ ,  $(1, -1, 2)$ ,  $(2, 1, -3)$

14. Given:  $x + y - z = 0$   
 $2x - 5y - z = 1$

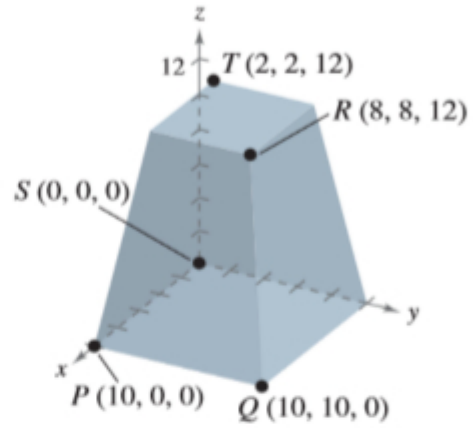
a) Find the angle in degrees between the following two planes with the given equations:

b) Find the line of intersection in parametric form. **(NO fractions and solve in terms of Z)**

15. Find the exact distance between the given point and plane.

$(-1, 2, 5)$  and  $2x - 3y + z = 6$

17. A tractor fuel tank has the shape and dimensions shown in the figure. In fabricating the tank, it is necessary to know the angle between two adjacent sides. Find this angle in degrees.



16. Find the general form for the equation of the plane that passes through  $(2, 2, 1)$  and  $(-1, 1, -1)$  and is perpendicular to the plane with equation  $2x - 3y + z = 3$

