

Hon Pre-Calc Test Chapter 11 2017 - 2018

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

1. Find the volume of the sphere given by the equation:

$$2x^2 + 2y^2 + 2z^2 - 2x - 6y - 4z + 5 = 0$$

2. Use vectors to determine if the points are collinear or not.

(1, 3, 2), (-1, 2, 5), and (3, 4, -1)

3. Find the EXACT area of a triangle with the given vertices: (2,4,0), (-2,-4,0), and (0,0,4)

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

a)  $\vec{u} = \langle 0, 1, 6 \rangle$   
 $\vec{v} = \langle 1, -6, -1 \rangle$

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

5. Determine the value of  $c$  such that  $\|c\vec{u}\| = \sqrt{58}$ , where  $\vec{u} = 2i + 3j + 4k$

6. Find the Exact unit vector orthogonal to  $\vec{u}$  and  $\vec{v}$  if  $\vec{u} = \mathbf{i} + \mathbf{j} - \mathbf{k}$  and  $\vec{v} = \mathbf{i} + \mathbf{j} + \mathbf{k}$

7. Given:

A(2, 1, 1), B(2, 3, 1), C(-2, 4, 1), D(-2, 6, 1)

a) Find the area of the parallelogram

b) Determine if the parallelogram is a rectangle  
(Show your work)

8. Find the volume of the parallelepiped with the given vertices:

A(0, 0, 0), B(3, 0, 0), C(0, 5, 1), D(3, 5, 1)  
E(2, 0, 5), F(5, 0, 5), G(2, 5, 6), H(5, 5, 6)

9. Find a set of parametric equations of the line that passes through the given points:

(-1, -1, 5), (2, -2, 3)

10. Find the general form for the equation of the plane passing through the given points:

(2, 3, -2), (3, 4, 2), (1, -1, 0)

11. Find the general form of the equation of the plane which passes through the point  $(1, -2, 4)$  and  $(4, 0, -1)$  is perpendicular to the  $xz$  plane.
12. Let  $M$  be the plane defined by the equation  $6x - 4y + 3z = 12$ . Find the general equation for the plane  $N$  that is parallel to  $M$  and passes through  $(3, -1, 4)$
13. Find the **Exact** component form of  $\vec{v}$ ,  $\vec{v}$  lies in the  $xy$  plane, has magnitude 20, and makes an angle of  $30^\circ$  with the positive  $x$  axis.
14. Find a set of parametric equations of the line that passes through  $(-4, 5, 2)$  and is perpendicular to  $-x + 2y + z = 5$
15. Find the distance between the point  $(1, 2, 3)$  and the plane  $2x - y + z = 4$

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

a) Find the angle between them.

b) Find parametric equations of their line of intersection.

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.



