# Calc 3 - Assignment #1

Note Title 9/2/2011

(1) Which of the points $P(6,2,3)$, $Q(-5,-1,4)$, and $R(0,3,8)$ is closest to the $xz$-plane? Which one lies in the $yz$-plane? Find $\text{dist}(P,Q)$.

(2) Describe and sketch the surface in $\mathbb{R}^3$ described by $x+y=2$. How about $y^2+z^2=4$? $4x^2+9y^2=1$?

(3) a) What does $x=4$ represent in $\mathbb{R}^3$. Sketch it.

b) How about $y=3$? And $z=5$? How about all $(x,y,z)$ for which $y=3$ and $z=5$?

(4) Find distance of $(3,7,-5)$ to

a) $xy$-plane b) $yz$-plane c) $xy$-plane

d) $x$-axis e) $y$-axis f) $z$-axis

(5) Find equation of a sphere center $(2,-6,4)$ and radius $5$.

(6) Find center and radius of the sphere

a) $x^2+y^2+z^2-6x+4y-2z=11$

b) $4x^2+4y^2+4z^2-8x+16y=1$

(7) Find equation of largest sphere with center $(5, 4, 9)$ contained in the first octant.

(8) Is the triangle formed by $P(3, -2, -3)$, $Q(7, 0, 1)$, and $R(1, 2, 1)$ a right triangle? Is it isosceles?

(9) Describe the following regions in $\mathbb{R}^3$:

a) $y \geq 0$

b) $0 \leq z \leq 6$

c) $x^2 + y^2 + z^2 \leq 3$

d) $x^2 + y^2 + z^2 > 2z$

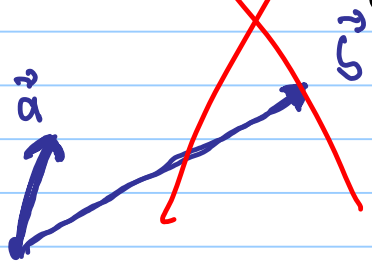
(10) What is the relationship between $(4, 7)$ and $\langle 4, 7 \rangle$

(11) Find $\vec{a} + \vec{b}$, $2\vec{a} + 3\vec{b}$, $\|\vec{a}\|$, and $\|\vec{a} - \vec{b}\|$ for $\vec{a} = \langle 5, -12 \rangle$, $\vec{b} = \langle -3, -6 \rangle$

(12) Find a unit vector in the direction of $\langle -4, 2, 4 \rangle$

(13) Find a vector in direction $\langle -2, 4, 2 \rangle$ with length 8.

(14) Use the following vectors to sketch




a) $\vec{a} + \vec{b}$

b) $\vec{a} - \vec{b}$

c) $\vec{b} - 3\vec{a}$