

Calc 3 - Assignment #1

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?

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

② 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 $\langle 4, 7 \rangle$?

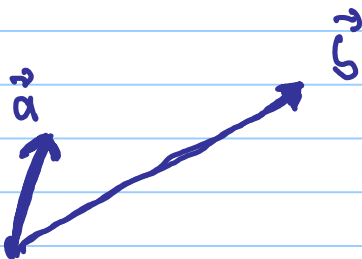
⑪ Find $\vec{a} + \vec{b}$, $2\vec{a} + 3\vec{b}$, $\|\vec{a}\|$, and $\|\vec{a} - \vec{b}\|$ for

$\vec{a} = \langle 5, -12 \rangle$, $\vec{b} = \langle -3, -6 \rangle$

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

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

⑭ Use the following vectors to sketch



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

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

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