

Calculus Aug 30

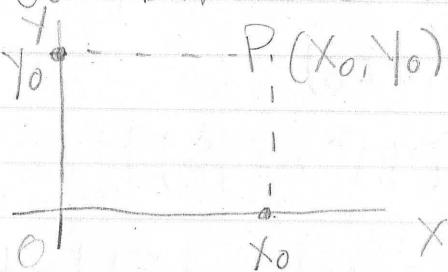
Rm 3304 Math
T.A. office

Reading \rightarrow 11.1, 11.2

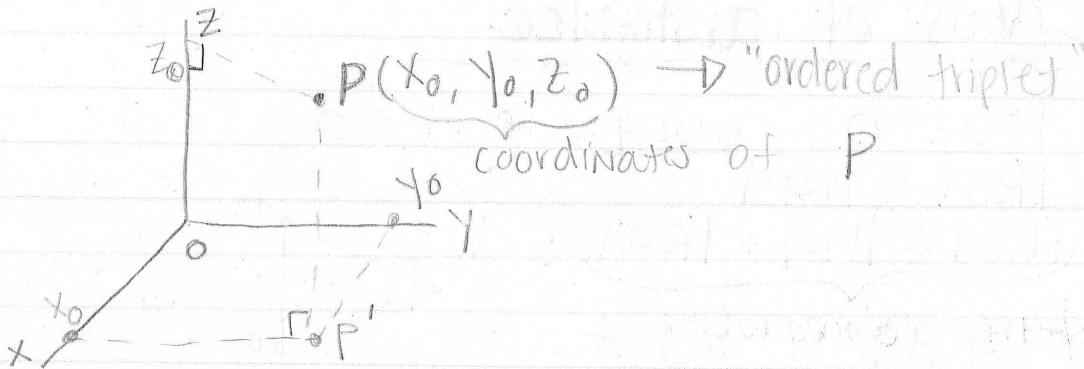
- 4 exams, lowest dropped
- 8 quizzes, lowest dropped

Vectors

11.1 COORDINATE SYSTEMS



3-dimensional space



The axis x, y, z separate space into 8 parts: octants
(1st octant - all coordinates are positive)

~~mmmm~~

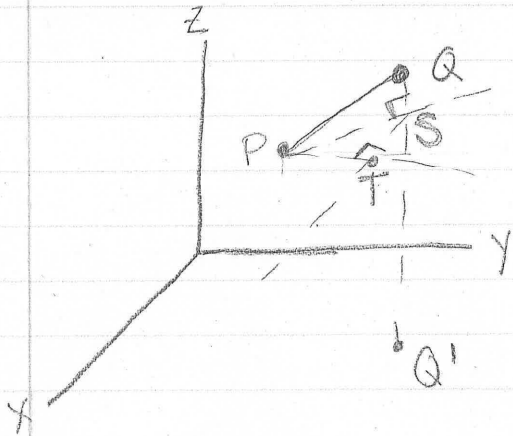
consider $P = (x_0, y_0, z_0)$ and $Q = (x_1, y_1, z_1)$

Distance between P & Q:

$$|PQ| = \sqrt{(x_1 - x_0)^2 + (y_1 - y_0)^2 + (z_1 - z_0)^2}$$

means
"distance b/w
P & Q"

$$(|x_1 - x_0|^2 + |y_1 - y_0|^2) + |z_1 - z_0|^2$$



$$|PQ|^2 = |PS|^2 + |SQ|^2$$

$$|SQ| = |z_1 - z_0|$$

$$|PS|^2 = |PT|^2 + |ST|^2$$

$$|PT| = |y_1 - y_0| \quad |ST| = |x_1 - x_0|$$

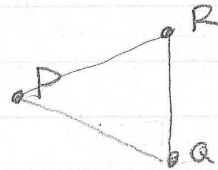
3 Laws of distance:

- If $|PQ| = 0$ ONLY if $P = Q$

• $|PQ| = |QP|$

• $|PQ| \leq |PR| + |RQ|$

* triangle inequality *



DEFINITION 1: Sphere with center $P_0 = (x_0, y_0, z_0)$ and radius $a =$ Set of all points (x, y, z) that satisfy

$$(x - x_0)^2 + (y - y_0)^2 + (z - z_0)^2 = a^2$$

Saying all points on a sphere are same distance from center (a)