

A) CALC 3 ESSENTIALS

- attend lectures \rightarrow print pre-lecture notes from WEBCT
- maintain homework journal (no pain, no gain?)
- keep up with text readings & LONSCAPA questions
- visit **CALC WORKSHOP** (124110) \rightarrow bring your JOURNAL

B) SYLLABUS

- ≈ 1 section per lecture hour (tentative schedule on WEBCT)
- mandated by faculty of science

C) MATH MYTHOLOGY

"advanced" math means bigger formulas?

formulas
equations
algorithms



concepts
ideas
abstractions

• analogies in learning

BASKETBALL

skills: dribble,
pass & shoot



playmaking, offense/defense,
teamwork.

ITALIAN

vocabulary
& grammar



conversation
& dialogue

do more examples!

- yes, practice matters (correctness, clarity, conciseness)
- your HOMEWORK JOURNAL is your logbook of "WORKOUTS"
- **PROBLEM RECOGNITION**: exam problems are not usually homework questions with the numbers changed.
- **IDEA SYNTHESIS**: 30+ sections of text, math 251 problems will combine these ideas
(don't get paralyzed on multi-step problems)
- **CONCEPT EXTRACTION**: examples can be illustrative, but sometimes don't communicate well the logical ideas

show your work ?

- weekly quizzes are targets for course content (WES @ C^{oo})
- quizzes & exams graded on presentation of solution
- keywords & explanation often superior to more math symbols

Give more applications!

- required for
MATH
STAT
PHYS
CHEM
ENSC.

- some application areas:

gateway to math analysis & diff'l equations

probability theory

electromagnetism, forces & potentials

celestial mechanics & astrophysics

thermodynamics & comput. quantum chem

hydrology, geology & GPS.

computer graphics

B) WEEK 1 READING

- sections 12.1-3

3D coordinates
vectors
dot product

C) COORDINATES IN 3 DIMENSIONS (s12.1)

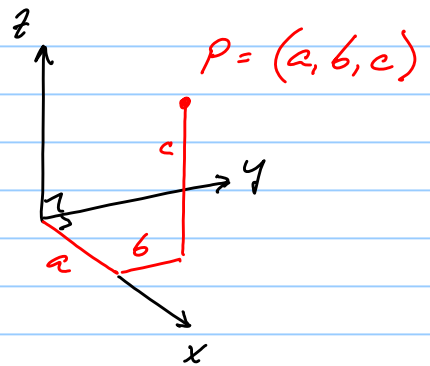
- - rule avoids mirror-inverted math!

- a POINT can be

identified in 3D space (\mathbb{R}^3) by

an (rectangular)

$$P = (\quad , \quad , \quad) \quad (p. 765)$$



- points in the xy -plane have $z =$

D) SETS OF POINTS

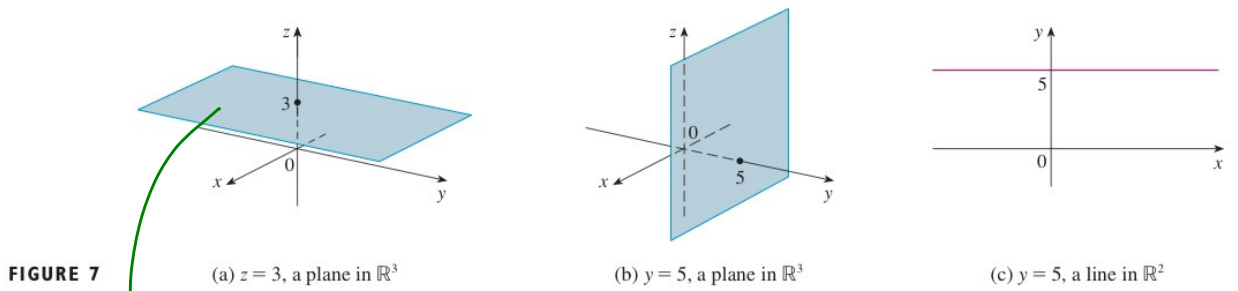
- example 1: what is the set of points whose z -coordinate is $z = 3$?

- set notation

$$S = \{ (x, y, z) \mid z = 3 \}$$

ordered
triples of coordinates such that

- for instance $(1, 2, \quad)$, $(6, -\pi, \quad)$, (\quad, \quad, \quad)
are in the set S

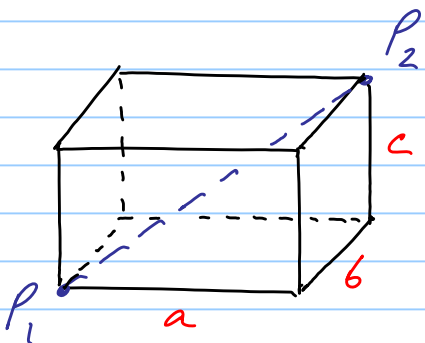


the set all points
with $z = 3$ is a
(surface)
to x, y -plane

• fig 7b $\{ (x, y, z) \mid y = 5 \}$ is a
(surface) in \mathbb{R}^3

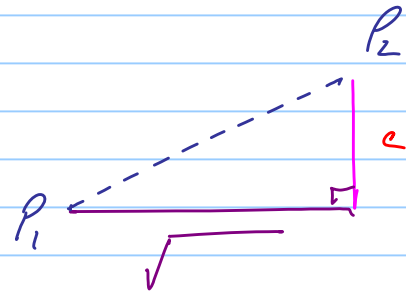
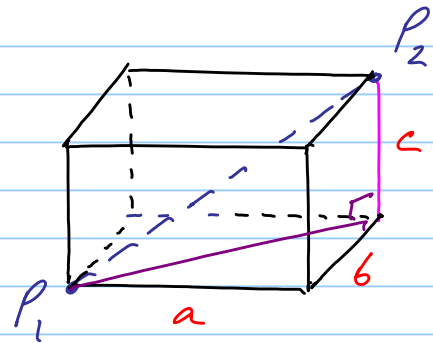
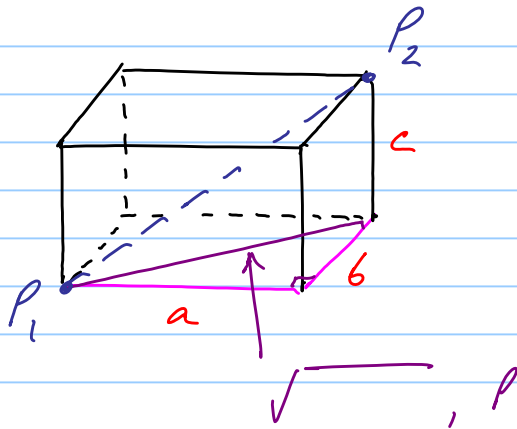
• fig 7c $\{ (x, y) \mid y = 5 \}$ is a line in \mathbb{R}^2

E) WHAT IS THE LENGTH OF THE DIAGONAL OF A
3D RECTANGULAR BOX?



$$|P_1 P_2| = \sqrt{\quad + \quad + \quad}$$

- derivation by repetitive use of



$$|P_1 P_2| = \sqrt{\sqrt{a^2 + b^2}^2 + c^2} = \sqrt{a^2 + b^2 + c^2}$$

F) DISTANCE FORMULA FOR 2 POINTS in \mathbb{R}^3

- 2 points in \mathbb{R}^3 define the opposite corners of a rectangular box

$$P_1 = (x_1, y_1, z_1)$$

$$P_2 = (x_2, y_2, z_2)$$

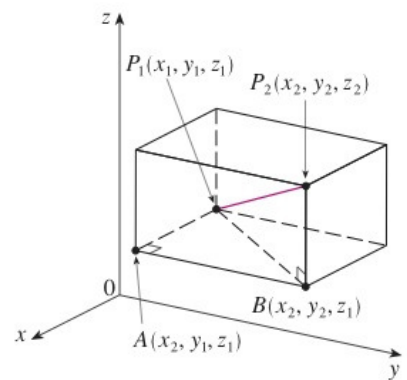


FIGURE 9

p767

$$\begin{aligned} \text{side in } x\text{-direction} &= |P_1A| \\ &= |x_2 - x_1| \end{aligned}$$

$$\begin{aligned} \text{and } |AB| &= |y_2 - y_1| \\ |BP_2| &= |z_2 - z_1| \end{aligned}$$

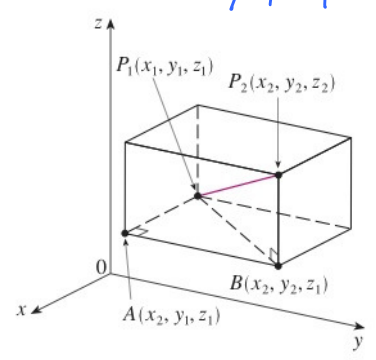


FIGURE 9

DISTANCE FORMULA IN THREE DIMENSIONS The distance $|P_1P_2|$ between the points $P_1(x_1, y_1, z_1)$ and $P_2(x_2, y_2, z_2)$ is

$$|P_1P_2| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

note, abs val not nec because of squaring

(c) WHAT IS THE SET OF POINTS WHOSE DISTANCE FROM $C = (h, k, l)$ IS r ($r > 0$)?

$$(a) \quad S = \left\{ (x, y, z) \mid \sqrt{(x-h)^2 + (y-k)^2 + (z-l)^2} = r \right\}$$

$$\text{OR } S = \left\{ (x, y, z) \mid (x-h)^2 + (y-k)^2 + (z-l)^2 = r^2 \right\}$$

(b) a **SPHERE** of radius r centred at the pt. $C = (h, k, l)$

equation for a sphere in $\mathbb{R}^3 \rightarrow$ spherical surface